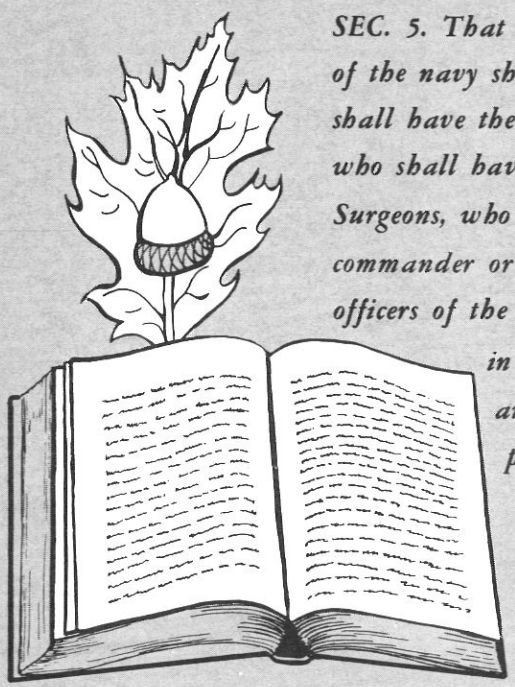
Navy Medical newsletter

FORTY-FIRST CONGRESS. SESS. III. CH. 117. *MARCH 3, 1871.*

CHAP. CXVII.— An Act making Appropriations for the naval Service for the Year ending June thirty, eighteen hundred and seventy-two, and for other Purposes.



OFFICERS OF MEDICAL CORPS ON ACTIVE LIST. NUMBER, RANK, AND PAY OF MEDICAL DIRECTORS; MEDICAL INSPECTORS, SURGEONS.

SEC. 5. That the officers of the medical corps on the active list of the navy shall be as follows:— Fifteen medical directors, who shall have the relative rank of captain. Fifteen medical inspectors, who shall have the relative rank of Commander; and Fifty Surgeons, who shall have the relative rank of lieutenant commander or lieutenant; and each and all of the above-named officers of the medical corps shall have the pay of surgeons in the navy as now provided; and medical directors and inspectors, on duty at sea, shall receive the pay of fleet surgeons . . . .

February 1970

Vol. 55 February 1970 No. 2

POLICY

The U.S. Navy Medical Newsletter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry and allied sciences. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article, in its original form. The opinions and conclusions expressed in the articles or items included herein are those of the respective authors and do not necessarily represent the views of the Department of the Navy, the Bureau of Medicine and Surgery or any other governmental department or agency thereof.

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The issuance of this publication was approved in accordance with NAVEXOS P-35.

NAVMED P-5088

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Credits: All pictures are Official Navy Photographs unless otherwise indicated.

Page 2: A 35-bed hospital at the Naval Air Station on Whidbey Island, including an intensive care and fully equipped coronary care unit, was dedicated on September 30, 1969. Shown cutting the traditional cake at the dedication ceremony are (left to right) CAPT Vance E. Senter, Commanding Officer, Naval Hospital, Whidbey Island; CAPT Veronica M. Bulshefski, Director, Nursing Division, Bureau of Medicine and Surgery, and; VADM George M. Davis, Surgeon General of the Navy.

from the Chief

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In the past I have had occasion to communicate with you concerning policy, problems and the day-to-day details of our Medical Department. Today it is my pleasure to present to you an altogether agreeable subject, one which I believe you will find most enjoyable: the announcement that at last we have found the "birth certificate" of the Medical Corps, and that we shall finally have a birthday.

Over the years, our medical officers have participated in the celebrations of the other Corps. These events contribute to Corps pride and an esprit de corps. We were determined to establish our legislative origin, and made a thorough search of the archives toward that end.

Our search indicates that we have had surgeons on ships since 1775. The first American Naval Surgeon, Joseph Harrison, was aboard the "Alfred" on that date when her first lieutenant, a young man named John Paul Jones, hoisted the first American flag ever to fly from a warship. In August 1842, Congress authorized five Bureaus, one of which was the Bureau of Medicine and Surgery, to conduct the business of the Navy. But it wasn't until the Act of March 3, 1871 that we find precise reference to a Medical Corps. The same Act made provision for Naval rank for surgeons and their responsibilities. It therefore seems logical to accept the latter date, and it is hereby proclaimed to be the birthdate of the Medical Corps! We are now almost 99 years old, but I believe you will agree that we have come of age without becoming senescent; rather, like wine, we are constantly improving with age, and have kept abreast of progress in an age far removed from our origins.

The year 1871 was a post-war period in which our Navy was recovering from a long and difficult war. Austerity was the theme of the day, and our predecessors were attempting to implement changes based on lessons learned from the recent war. One of the lessons learned in that war was the need for well organized Medical Departments for the Army and the Navy. Thus the Navy Medical Corps was a child of necessity.

Prompted by the significance of the occasion, I am sure that medical activities throughout the world, wherever possible, will plan for appropriate official and social events on the occasion of our first birthday party.

An excerpt from the Appropriations Act approved on March 3, 1871, appears elsewhere in this issue of the Medical Newsletter. The wording is typical of a few generations ago. It clearly established the solid foundations on which we have continued to build for almost ninety-nine years.

To the Navy Medical Corps, and to each of you who play such an integral role in sustaining its proud tradition, I extend congratulations and best wishes for a happy and eventful birthday.

G. M. Davis

G. M. DAVIS
Vice Admiral, MC, USN
Surgeon General

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FEATURE ARTICLE

NAVY MEDICAL CORPS—ITS GESTATION, BIRTH AND BAPTISM

By Mr. W. Kenneth Patton, Medical Historian, Bureau of Medicine and Surgery.

Although the framers of the Constitution had conceived the idea of an Army and Navy, the affairs of both military departments were administered by a single Department of War until 1798. While the infant Nation was debating whether or not to institute a Navy, medical men were sailing in United States, Constitution, Constellation and other vessels. Early Navy physicians served largely without commissions except those issued by the commanding officers of ships to which physicians were attached for a specific cruise. There were two basic categories of medical men: Surgeons, who had established reputations as physicians, some of them holding degrees in medicine; and Surgeon's Mates who had received medical training, but were relatively inexperienced. Both Surgeons and Surgeon's Mates were classified as commissioned officers, but were not eligible to succeed to command. The Surgeon's Mates ranked junior in status to Surgeons, but senior to Warrant Officers.

The United States Navy was created by Act of Congress, approved 30 April 1798. No provision was made, however, for a standardized system of medical practices despite the establishment of a separate Navy Department. Should he have desired to do so, a ship's captain could have appointed a blacksmith as ship's surgeon.

Professional qualifications and a regulated system of medical appointments were finally established by Act of Congress approved 24 May 1828. This Act provided that "no person shall receive the appointment of assistant surgeon in the Navy of the United States, unless he shall have been examined and approved by a Board of naval surgeons, who shall be designated for that purpose by the Secretary of the Navy Department". The title "Surgeon's Mate" was replaced by the designation "Assistant Surgeon". The Act further stipulated that an Assistant Surgeon could be examined by a Board of medical examiners for appointment as a Surgeon after serving a minimum of 2 years on board a public vessel of the United States. A candidate who satisfactorily completed the examination became designated as "Passed Assistant Surgeon", but could not be promoted to Surgeon unless and until a vacancy occurred. Those who had already attained the rank of Surgeon prior to passage of this Act, were excused from a qualifying examination.

Several Surgeons, notably Edward Cutbush, Thomas Harris and William Barton, had long advocated the creation of a Medical Department as an integral unit of the Navy establishment. Recognizing the need, Congress had provided for personnel and facilities to treat the sick and injured. Medical affairs were administered by a Board of Commissioners consisting of 3 senior Captains (Line), however, until 1842. By Act of Congress approved 31 August 1842, a Bureau of Medicine and Surgery was established. (Four other Bureaus were created by the same Act, and were subsequently reorganized and retitled.) Surgeon William Paul Crillon Barton, who had entered the Navy in 1809, was selected as the first Chief, Bureau of Medicine and Surgery. He disliked the title "Surgeon General", which was not adopted until the fifth Chief of the Bureau, William M. Wood, assumed that office. The total staff of the Bureau consisted of 5 individuals: Dr. Barton, an Assistant Surgeon and 3 civilians—2 clerks and a messenger. The Bureau Chief was paid $2,500 per annum; the Assistant Surgeon received the pay of his grade (probably about $850); the combined annual salaries of 3 civilian personnel could not exceed $2,700.

In his first Annual Report to the Secretary of the Navy, Surgeon Barton complained of a debt of some $50,000 for Surgeons' Necessaries inherited from the previous year (1841). Since the annual appropriation for Medical Department expenditures was only $30,000 for 1842, Dr. Barton was faced with deficit spending from the start. Evidence indicated that the deficit resulted, in part, from unauthorized purchases of frock coats, pantaloons and other toggery, charged to the appropriation for "medicines, surgical instruments, etc".

The Navy Register for 1842 listed 69 Surgeons, 11 Passed Assistant Surgeons and 55 Assistant Surgeons. Of these 135 medical officers, 75 were assigned duty afloat. Fleet Surgeons served on flagships; other medical officers were assigned to duty at Navy-yards and on Receiving Ships. Only 9 medical

officers were serving on duty at the 4 existing Naval Hospitals and at the Navy Asylum, 2 at each facility except for the hospital at Chelsea, Mass., which was apparently a one-man operation. Three other naval hospitals then in commission were located at Brooklyn, N.Y., Portsmouth, Va. and Pensacola, Fla. The facility in Philadelphia, Pa. was called the Navy Asylum (Naval Home), although it often functioned as a hospital.

In 1861-1865, during the War for the Suppression of the Rebellion, a number of medical officers resigned and many served in the Confederate States' Navy. Approximately 150 physicians accepted acting appointments as medical officers in the Federal Navy and many remained on active duty following the war. (Included among the 150 were 3 medical officers who would later be appointed to the office of Surgeon General: N. L. Bates, W. K vanReypen and J. R. Tryon.) It became common practice to refer to Navy physicians as members of the "Medical Corps". (The Army had adopted the term as early as 1818). In 1866 and subsequently, frequent reference to the "Medical Corps" appeared in the Surgeon General's Annual Reports to the Secretary of the Navy. The first firm legislative reference to the Navy Medical Corps was not to appear until the year 1871.

On 3 March 1871 the Forty-First Congress enacted the Appropriations Act which established the Medical Corps as a separate entity and as a Staff Corps of the Navy. The Act also provided that the Chief of the Bureau of Medicine and Surgery would have the title of Surgeon General and the relative rank of Commodore. Section 5 of the Appropriations Act for the naval Service, the birth certificate for the Navy Medical Corps, is reflected in the following excerpt.

FORTY-FIRST CONGRESS. Sess. III. Ch. 117 1871

March 3, 1871. CHAP. CXVII.—*An Act making Appropriations for the naval Service for the Year ending June thirty, eighteen hundred and seventy-two, and for other Purposes.*

* * * *

Bureau of medicine and surgery.

Medical department and surgeons' necessaries.

Repairs of laboratory, hospitals, Etc.

Civil establishment at hospital at Chelsea; New York.

Bureau of Medicine and Surgery.—For support of the medical department, for surgeons' necessaries for vessels in commission, navy yards, naval stations, marine corps, coast survey, not including the families of officers on shore stations, fifty thousand dollars.

For necessary repairs of naval laboratory, hospitals, and appendages, including roads, wharves, outhouses, steam-heating apparatus, sidewalks, fences, gardens, farms, and for grading and laying off the grounds of the two new hospitals, forty thousand dollars.

For pay of the civil establishment under this bureau: At the hospital at Chelsea, Massachusetts, seven thousand seven hundred and eighty-two dollars.

At the hospital, New York, eleven thousand three hundred and thirty-six dollars.

Civil establishment at hospital at Philadelphia;

At the hospital, Philadelphia, six thousand nine hundred and ninety dollars.

Washington;

At the hospital, Washington, District of Columbia, five thousand and seventy dollars.

Annapolis;

At the hospital, Annapolis, Maryland, four thousand five hundred and twelve dollars.

Norfolk;

At the hospital, Norfolk, Virginia, five thousand four hundred and six dollars.

Pensacola;

At the hospital, Pensacola, Florida, five thousand and ninety-four dollars.

Mare Island;

At the hospital, Mare Island, California, eight thousand eight hundred and seventy-two dollars.

At the naval laboratory, New York, five thousand six hundred dollars. Laboratory, New York;

At the navy yard, Portsmouth, New Hampshire, one thousand two hundred and ninety dollars. Navy yard at Portsmouth;

At the navy yard, Boston, Massachusetts, one thousand four hundred and eighty dollars. Boston;

At the navy yard, New York, one thousand four hundred and eighty dollars. New York;

At the navy yard, Philadelphia, one thousand four hundred and eighty dollars. Philadelphia;

At the navy yard, Washington, District of Columbia, one thousand four hundred and eighty dollars. Washington;

At the navy yard, Norfolk, Virginia, one thousand four hundred and eighty dollars. Norfolk;

At the naval station, Mound City, Illinois, one thousand four hundred and eighty dollars. Naval station at Mound City.

For contingent expenses of the bureau, freight on medical stores, transportation of insane patients to the government hospital, advertising, telegraphing, purchase of books, expenses attending the naval medical board of examiners, purchase and repair of wagons, harness, purchase and feed of horses, cows, trees, garden tools, seeds, thirty thousand dollars. Contingent expenses.

SEC 5. That the officers of the medical corps on the active list of the navy shall be as follows:— Officers of medical corps on active list.

Fifteen medical directors, who shall have the relative rank of captain. Number, rank, and pay of medical directors;

Fifteen medical inspectors, who shall have the relative rank of commander; and medical inspectors,

Fifty surgeons, who shall have the relative rank of lieutenant commander or lieutenant; and each and all of the above-named officers of the medical corps shall have the pay of surgeons in the navy as now provided; and medical directors and inspectors, on duty at sea, shall receive the pay of fleet surgeons. surgeons;

One hundred assistant surgeons, who shall have the relative rank of master or ensign, with the present pay of assistant surgeon in the navy: *Provided,* That assistant surgeons of three years' service, who have been found qualified for promotion by a medical board of examiners, shall have the pay of past assistant surgeons, as now provided; and passed assistant surgeons shall have the relative rank of lieutenant or master; and no person under twenty-one, or over twenty-six years of age, shall hereafter be appointed an assistant surgeon in the navy. Assistant surgeons. Proviso.

* * * *

The "Register of the Commissioned, Warrant and Volunteer Officers of the Navy of the United States including officers of the Marine Corps and others, to July 1, 1871" issued by the Government Printing Office in 1871 is the first issue of any Register which lists a "Medical Corps" and uses the title of Surgeon General for the Chief of the Bureau of Medicine and Surgery. In addition to the Surgeon General, William Maxwell Wood, there were 153 medical officers listed in the 1871 "Register".

This article will be concluded in the March issue of the Medical Newsletter.

MEDICAL ARTICLES

CORRELATIVE LIGHT AND ELECTRON MICROSCOPY IN PRIMARY HYPERPARATHYROIDISM

William C. Black III, MD, St. Louis, Arch Path 88(3):225–241, September 1969.

Surgical procedures for primary hyperparathyroidism have increased in this hospital following institution of routine screening of serum calcium levels. The clinical, surgical, and pathological aspects of hyperparathyroidism appear to be changing. The distinction between chief cell hyperplasia and parathyroid adenoma has become more difficult. Parathyroid ultrastructure was studied in an effort to better understand subtle morphologic changes seen by light microscopy. The parathyroid glands resected concomitantly with an adenoma appeared ultrastructurally inactive. Nondiagnostic parathyroid glands suggestive of chief cell hyperplasia by light microscopy revealed ultrastructural evidence of activity supporting a diagnosis of chief cell hyperplasia, and recurrent hyperparathyroidism developed in some patients. Correlation between light and electron microscopy is good and aids in predicting postoperative recurrence. Chief cell hyperplasia may be a more common form of primary hyperparathyroidism than is realized.

Surgical exploration reveals either an adenoma or chief cell hyperplasia in over 90% of patients with primary hyperparathyroidism. The diagnostic distinction between these forms of hyperparathyroidism at the time of operation is important, since surgical therapy for adenoma and hyperplasia differs. Resection of an adenoma is curative, but chief cell hyperplasia involves all parathyroid glands, albeit often unequally in terms of gland size. Resection of a single large parathyroid mass in chief cell hyperplasia may not alleviate hyperparathyroidism, or relief may be temporary with recurrence months or years later, and removal of two or three and a portion of a fourth parathyroid is recommended. While chief cell hyperplasia was recognized only relatively recently as a distinct entity, this disease is not rare and accounts for at least one in four cases of hyperparathyroidism. In our experience, it is very difficult to distinguish between an adenoma and a large nodular hyperplastic parathyroid gland at frozen section. However, the separate parathyroid glands accompanying a functioning adenoma are expected to be normal in size or atrophic, while in chief cell hyperplasia, all glands should be abnormal. The concept of parathyroid atrophy in glands coexistent with an adenoma is traditional, but it is doubtful that surgeons can recognize either atrophy or minimal hyperplasia at operation. Thus, we have learned to depend upon microscopic examination of parathyroid glands other than the tumorous gland in differentiating adenoma and primary hyperplasia. If the smaller glands are microscopically normal, the parathyroid tumor is assumed to be an adenoma. If a gland, even of normal size, shows histologic evidence of hyperplasia, a presumptive diagnosis of chief cell hyperplasia is made.

In the past 2½ years, a serum calcium level has been routinely obtained in patients seen at Barnes Hospital (multichannel autoanalyzer). Chemical evidence of hyperparathyroidism has been detected in patients who are only questionably symptomatic or asymptomatic with reference to their parathyroid disease. In such patients, the findings at surgery have not been uniform. The parathyroid glands removed or biopsied have, in certain instances, shown only equivocal gross and microscopic evidence of hyperplasia, with no tumor discovered. In other patients with small parathyroid tumors, presumed to be adenomas, chief cell hyperplasia has been difficult to absolutely exclude after microscopic examination of other glands.

For these reasons ultrastructural evaluation of normal or nearly normal glands became of interest. This study compares light and electron microscopic morphology of such parathyroid glands. Theoretically, the fine structure of normal glands accompanying an adenoma should reflect cellular inactivity or atrophy while that of a small hyperplastic gland should suggest hyperfunctional activity. It was hoped that a better understanding of subtle light microscopic features typical of inactive and hyperactive parathyroid glands might be gained. Furthermore, occasional patients from whom an "adenoma" had

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TABLE 1.—*Clinical, Laboratory, and Operative Findings*

Case No.	Clinical Data	Duration	Serum Calcium *	Serum Phosphorus †	Adenoma	Other Parathyroid Glands
1	75-yr-old woman with dysphagia, the sensation of a mass in her throat, and anxiety neurosis	"Many years"	11.6-12.0	2.8	Right inferior 1.5x1.3 cm	Left inferior excised Left superior visualized Right superior visualized
2	60-year old woman followed in clinic for congestive heart failure. No symptoms of hyperparathyroidism	...	11.6-11.8	3.1	Left superior 3.4x1.4 cm	Right inferior excised Left inferior biopsied Right superior visualized
3	52-year-old woman admitted to the psychiatric unit with severe headaches and hysteria. She had passed a renal stone 9 yr previously	10 yr	11.6-11.8	2.6	Left inferior 1.4x1.1 cm	Left superior biopsied Right superior visualized Right inferior visualized
4	75-year-old man with aching pain in his back and abdomen (for which he was seen in clinic)	"Many years"	13.3	2.6	Right inferior 1.5x0.9 cm	Left superior excised
5	49-year-old woman followed in clinic for mild essential hypertension. No symptoms of hyperparathyroidism	...	11.5-12.5	2.9	Right superior 2.2x1.9 cm	Left inferior excised
6	54-year-old women seen in allergy clinic for complaints unrelated to hyperparathyroidism. She had passed a renal stone 5 yr previously	5 yr	11.5-12.6	2.8	Left inferior 1.2x1.0 cm	Right inferior excised
7	58-year-old man with severe flank pain who passed a stone shortly after admission. Calcium deposits had been removed from his shoulder and elbow joints 20 yr previously	20 yr	11.3	2.4	Right inferior 1.0x0.9 cm	Left superior biopsied Left inferior biopsied
8	27-year-old man with recurrent nephrolithiasis	8 mo	11.0-14.0	2.2	Right superior 2.5x1.5 cm	Right inferior excised
9	73-year-old woman complained of polyuria, parasthesia, and muscle cramps when seen in cardiac clinic	Indefinite	11.7	2.5	Right inferior 1.0x0.6 cm	Left superior excised Right superior biopsied Left inferior biopsied
10	48-year-old woman followed in clinic for hypothyroidism as a complication of prior ^{131}I therapy for hyperthyroidism. No symptoms of hyperparathyroidism	...	10.3-12.2	2.4	Left inferior 1.1x0.8 cm	Left superior biopsied Right superior visualized Right inferior visualized
11	40-year-old woman with symptoms of fatigue, nausea, and severe headaches	1 yr or more	11.2-14.5	1.9	Left superior 1.5x1.4 cm	Left inferior biopsied Right inferior biopsied Right superior visualized

* Serum calcium levels in mg/100 ml; 10.5 mg/100 ml is the upper limit of normal in this hospital.
† Serum phosphorus levels in mg/100 ml; 3.0 mg/100 ml is the lower limit of normal in this hospital.

been resected might conceivably be shown to have chief cell hyperplasia instead on the basis of ultrastructural study, and the case could be followed carefully for recurrence. In the event that all resected tissue from a given patient appeared ultrastructurally inactive, further search for an adenoma in an ectopic location, or perhaps for an "exogenous" parahormone producing tumor, would be encouraged.

Methods

The definitive study group consisted of 11 patients in whom a diagnosis of parathyroid adenoma had been made at the time of operation. In each case, multiple tissue blocks for light and electron microscopy were taken from the tumors as well as from a concomitantly resected separate parathyroid gland. Tissue for ultrastructural study was fixed in buffered 2% glutaraldehyde for 30 minutes and transferred to 1% buffered osmium tetroxide for eight hours prior to dehydration and embedding in epoxy resin. Light microscopic sections were stained with hematoxylin and eosin, while thin sections for electron microscopy were stained with either uranyl acetate or lead citrate and examined in an electron microscope. Corresponding thick (1 μ) and thin sections were available for comparison between phase contrast microscopy and ultrastructural detail. In certain patients, small parathyroid glands in addition to the gland utilized for electron microscopy were biopsied or excised and were studied in hematoxylin and eosin sections.

A control group of five patients with well-documented long term renal disease and secondary hyperparathyroidism provided surgically excised parathyroid tissue for light and electron microscopic study.

A second group of four patients with definite primary chief cell hyperplasia was included. In each case, a hyperplastic parathyroid gland of normal size was examined.

Results

The clinical and laboratory findings are outlined in Table 1. Serum phosphorus levels were depressed in all but one patient and ranged from 1.9 to 2.8 mg per 100 ml. In case 2, the serum phosphorus value was 3.1 mg/100 ml. Tubular reabsorption of phosphate (TRP) was studied in ten patients and was significantly reduced in eight (45% to 77%; normal range is 80% to 90%). In case 3 and 6, the TRP value was 79% and 81%, respectively (borderline). Postoperative calcium and phosphorus levels returned to normal in each patient. There was no chemical evidence of recurrence in eight patients followed for periods of from 1 to 19 months. In case 11, both serum calcium and phosphorus values suggested recurrence 19 days postoperatively and were diagnostic of hyperparathyroidism on the 41st postoperative day (calcium level, 11.7 mg/100 ml and phosphorus, 2.7 mg/100 ml). In case 9, the serum calcium and phosphorus levels were within normal limits seven months postoperatively, but one month later suggested recurrence with serum calcium value at 10.4 mg/100 ml, and phosphorus, 2.9 mg/100 ml. In case 6, persistent hypercalcemia (11.0 mg/100 ml) with low serum phosphorus level was noted within two months following surgery (Table 2). The clinical and laboratory details pertinent to five control patients with secondary hyperparathyroidism (long-term renal failure) and four patients with chief cell hyperplasia are given elsewhere. These patients had diminished TRP values and the parathyroid glands were diffusely enlarged in patients with secondary hyperplasia. All patients with chief cell hyperplasia had hypercalcemia, hypophosphatemia, and low TRP values.

The size and location of the adenomatous parathyroid glands are given in Table 1. Microscopically, these tumors displayed a great variety of tissue patterns and cell types. While the oxyphilic chief cell and transitional chief cell were most common, oxyphils and islands of water clear chief cells were present in many lesions. The corresponding ultrastructural equivalents of these cells are found in Fig 2 (not shown). The water clear and transitional chief cells characteristically contained considerable cytoplasmic glycogen and, often, a large quantity of rough surfaced endoplasmic reticulum. An extensive Golgi apparatus was almost always evident, and the plasmalemma was usually markedly folded, complex, and interdigitating. Secretory granules were present in small numbers in many water clear and transitional chief cells, while mitochondria were small and sparsely scattered as were lipid droplets. The oxyphilic chief cell contained more numerous mitochondria and somewhat less prominent rough surfaced endoplasmic reticulum, glycogen, and Golgi bodies. The oxyphils were typically packed by individually large mitochondria which crowded out other organelles. Occasional lipid droplets or clusters of secretion granules were present in these cells, and small quantities of glycogen were morticed between the mitochondria. Ultrastructurally, cells intermediate between the oxyphil and oxyphilic chief cell, between the latter and the transitional chief cell, and between the transitional

TABLE 2.—*Correlation of Light and Electron Microscopy of "Normal" Parathyroid Glands*

Case No.	Review of Light Microscopy	Ultrastructure	Clinical Follow-up Study	Current Diagnosis
1	Normal gland	Inactive/Atrophic	...	...
2	Normal gland	Inactive/Atrophic	Chemically normal (1-11 mo)	Adenoma
3	Normal gland	Inactive/Atrophic	...	...
4	Normal gland	Inactive/Atrophic	...	...
5	Normal gland	Active cells	Chemically normal (2 mo)	Uncertain
6	Normal gland	Active cells	Recurrence (2 mo)	Hyperplasia
7	Normal gland	Hyperplasia	Chemically normal (5 mo)	Uncertain
8	Possible hyperplasia	Active cells	Chemically normal (4 mo)	Uncertain
9	Possible hyperplasia	Active cells	Probable recurrence (8 mo)	Probable hyperplasia
10	Possible hyperplasia	Hyperplasia	Chemically normal (20 mo)	Possible hyperplasia
11	Possible hyperplasia	Hyperplasia	Recurrence (1 mo)	Hyperplasia

chief and water clear cell were very common. Thus, a spectrum of cell "types" existed at the ultrastructural level and correlated nicely with a similar spectrum seen by light microscopy. Acini within the tumor tissue were usually formed by oxyphilic chief cells, often with microvilli along the lumenal surface. It was very difficult to assess cell populations within a given tumor due to the variability of cell types and tissue patterns. The tumors in case 1, 6, 7, and 9 showed the full spectrum of cell types. The tumors in case 8 and 10 were composed of transitional chief cells with little variation, and this cell predominated in case 2 and 4. The oxyphilic chief cell was representative of most of the tissue in case 11, while slightly enlarged chief cells made up the bulk of the tumors in case 3 and 5 with admixtures of other types.

The light and electron microscopic features of the cells from patients with chief cell hyperplasia or secondary hyperplasia were relatively similar to those seen in the adenomatous glands. The hyperplastic glands as a whole were composed of cells which tended to display more uniformly prominent Golgi bodies, copious rough endoplasmic reticulum, and more numerous polyribosomes, as compared with the more variable cells of the adenomas. The morphology of the hyperplastic glands has been more fully demonstrated elsewhere.

The "normal" parathyroid glands were evaluated grossly and in permanent sections. In case 1 through 7 the glands were within normal limits for size and weight (less than 50 mg). They contained abundant fat, as well as small chief cells arranged in thin cords and trabeculae. Thus, the permanent sections confirmed the frozen section impression of normal parathyroid glands. The "normal" glands in case 8 through 11 showed decreased fat in proportion to epithelial mass. The parenchyma included transitional chief cells, cells not ordinarily seen in normal adult parathyroid glands. Furthermore, these glands displayed nodular masses of cells or trabecular and microacinar cell patterns, features familiar in hyperfunctional parathyroid glands (Table 2).

The ultrastructure of the tissue in case 1 through 4 was quite uniform. The cells contained large quantities of lipid in homogeneous and microvesicular vacuoles. Some globules were enormous and displaced other cytoplasmic organelles, apparently comprising as much as half the cytoplasmic volume. Rough surfaced endoplasmic reticulum was reduced to a few scattered dilated profiles. Golgi apparatus was rarely seen, and the cytoplasm, otherwise, contained small mitochondria, dispersed ribosomes, glycogen, and a variety of small lysosomal dense bodies. The plasmalemma was usually simple in configuration or formed villous folds between separated cells. Secretion granules were not present in most cells, but in a few, they were packed in large numbers toward the basement membrane adjacent to lipocytes. The fine structure of the remaining seven glands was distinctly different in that cytoplasmic fat was not conspicuous, and the rough surfaced endoplasmic reticulum and Golgi apparatus were prominent. In the majority of cells, whether of small oxyphilic or transitional chief type, organelles were as conspicuous as in the corresponding cells of the patient's "adenoma." Stacked or whorled profiles of endoplasmic reticulum accompanied by numerous polyribosomes and a large Golgi apparatus were commonly present in the cells of the "normal" glands

in case 7, 9, 10, and 11. These structures were easily identified in the remaining glands (case 5, 6, and 8), but the Golgi apparatus and endoplasmic reticulum were less prominent and not nearly as complex in structure. The content of glycogen and numbers and size of mitochondria in cells from all cases varied as suggested by the light microscopy of the tissue in question. The degree of complexity of the plasmalemma tended to parallel that of the Golgi apparatus and endoplasmic reticulum. Clumps of secretion granules were most common in oxyphilic chief cells and were not often seen in the presence of prominent Golgi apparatus and endoplasmic reticulum. Nuclear and nucleolar structure did not correlate specifically with other cytologic detail.

Comment

As in any microscopic study, the problem of sampling error must be considered in evaluating these observations. In electron microscopy, this problem is magnified, even as the tissue. The "adenomas" were particularly difficult to appraise due to cellular heterogeneity. The "normal" glands posed much less of a problem since the epithelial mass was smaller, and, with the exception of three cases, the tissue was uniform by light microscopy. In examining a number of blocks from these parathyroid glands, surprisingly little fine structural variability was seen.

Translation of structure into an appraisal of cellular activity is a captious process. In the case of the parathyroid gland, however, there appear to be certain ultrastructural characteristics common to cells from glands which are clinically and pathologically abnormal. These characteristics suggest a cause and effect relationship between structure and increased synthesis and release of parahormone. While it is difficult to measure cytoplasmic organelles and other constituents in terms of their relative prominence and organization, it is possible to make a rough quantitative evaluation by examining thin sections from several levels of different tissue blocks. The most uniformly striking cytologic features in control patients with secondary hyperparathyroidism or chief cell hyperplasia involved the extensive Golgi apparatus and the large quantity of rough surfaced endoplasmic reticulum arranged in stacks and whorls. The same features were present, at least to some degree, in each adenoma. Increased numbers of secretion containing cells and marked complexity of the plasmalemma were also seen. Taken together, these observations suggest cellular hyperactivity and are similar to those made in other studies of parathyroid adenomas and parathyroid hyperplasia. It can be inferred that small fatty glands composed of lipid rich structurally "antithetic" cells (poorly developed Golgi apparatus and archiplasm, etc) are atrophic or, at least, inactive. Roth and Munger examined the compressed remnant of a parathyroid gland at the margin of an adenoma ultrastructurally, and they described features like those in the glands of case 1 through 4.

The effects of direct or indirect manipulation of serum calcium levels upon mammalian parathyroid ultrastructure are pertinent. Capen et al have compared the glands of nonpregnant, nonlactating cows with those of pregnant and recently postparturient animals. In the latter, they found an especially well developed Golgi apparatus containing prosecretory material, prominent archiplasm, and complex interdigitating cell membranes. In contradistinction, nonpregnant cows fed vitamin D showed cellular atrophy with few secretory granules and poorly developed Golgi apparatus and archiplasm. Furthermore, cytoplasmic lipid was increased as in case 1 through 4 in the current study. In postparturient paresis, cattle exhibit hypocalcemia which Capen and Young could not ascribe to defective parathyroid function. Instead, they found ultrastructural evidence of hyperplasia, much as in the normal postparturient animal. In kittens rendered calcium deficient, parathyroid hyperplasia develops with the same general changes in Golgi apparatus, rough surfaced endoplasmic reticulum, and plasmalemma described in postparturient cattle. Melson induced parathyroid hyperplasia in rabbits with ferric glycerophosphate and noted similar changes in cellular fine structure, as did Lever in the rat and Stoeckel and Porte in the mouse. The latter investigators utilized hyperphosphatemia to stimulate the glands, and exogenous vitamin D, parahormone, and calcium to depress the parathyroid glands. The elegant manipulations of rat parathyroid growing in organ culture performed by Roth and Raisz showed these cells to be highly sensitive to variations in calcium levels in the ambient medium. Ultrastructural observations were correlated with measurements of amino acid uptake, protein synthesis, and protein release. They were able to reversibly alter the organelles discussed above, as well as glycogen and secretion content, in a manner correlating well with in vivo experiments.

The nature of the Golgi apparatus and archiplasm appear to best reflect the status of cellular parathyroid function. Less obvious indications of activity include complexity of the plasmalemma, aggregation of ribosomes, and the presence of prosecretory ma-

terial in the Golgi apparatus. Secretion content per se is difficult to correlate since a few cells in apparently inactive glands contain large numbers of granules (stored ?), while the majority of a population of hyperfunctional cells may be devoid of granules (exhaustion or rapid release ?). In kittens with parathyroid hyperplasia secondary to a calcium deficient diet, secretion granules become less conspicuous as hyperplasia progresses. Cytoplasmic fat is also difficult to evaluate in that certain adenomas and primarily hyperplastic glands contain very active cells which are, nevertheless, rich in lipid. Melson noted increased lipid in hyperplastic rabbit parathyroid glands as well, yet the least active cells in the current study (case 1 through 4) contained the most fat. Cellular glycogen poses a problem since it has been shown that normal parathyroid cells undergo cyclical functional changes and that the less active "light" chief cells contain more glycogen than their more active "dark" chief cell counterparts. However, the enlarged chief cells of abnormal parathyroid glands, whether of transitional chief or water clear type, are typically loaded with glycogen and yet display very prominent Golgi apparatus and archiplasm, etc. At the same time, glycogen is not appreciable in all "active" cells. (In primary water clear cell hypertrophy and hyperplasia, the cells owe their appearance to the presence of large cytoplasmic vacuoles rather than to glycogen. While I have not examined tissue from this type of hyperplasia, the water clear cells in this study have invariably been glycogen filled. It seems probable the water clear cell hypertrophy and hyperplasia is an entity distinct from chief cell hyperplasia.) Mitochondria greatly influence the light microscopy of parathyroid cells, but it is difficult to correlate their number and size with other structural parameters. Full blown mitochondrion packed oxyphils seldom contain extensive Golgi apparatus or archiplasm, but oxyphilic chief cells may show both.

The extent of agreement between light and electron microscopy in this study is reasonably good. This is particularly true if the small control glands from each of four patients with chief cell hyperplasia are included. These parathyroid glands individually were only equivocally hyperplastic by light microscopy, and the diagnosis was based on other obviously hyperplastic glands which were resected in each case. Thus, when hyperplasia was suspected by light microscopy, ultrastructural confirmation of activity was found in each instance (case 8 through 11 and the four control patients). Of seven parathyroid glands considered normal by light microscopy, however, only four showed the ultrastructural inactivity expected. Two patients (case 5 and 6) had active glands, and one (case 7) a hyperplastic parathyroid gland. Sampling error may provide an explanation, in that we have found that small hyperplastic glands often have nodular foci of cellular proliferation between larger areas of fatty normal appearing parenchyma. It may be that the tissue utilized for electron microscopy was taken from an area of focal hyperplasia in these cases, and that the remainder of the gland, utilized for paraffin or frozen sections, was apparently normal. The evaluation of the degree of cellular activity in a given case correlated poorly with postoperative follow-up study. Only one of two patients with hyperplastic glands has developed recurrent hyperparathyroidism (case 10 and 11), while one and probably two patients (case 6 and 9) with somewhat less active parathyroid glands have shown recurrence. The amount of parathyroid parenchyma left intact at the time of surgery does not correlate with the postoperative course either. For example, two of the individuals with recurrence or probable recurrence have less residual tissue than those who remain cured (see case 9 and 11 in Table 1). The patient represented as case 10 has two parathyroid glands remaining, which were untouched during surgery, together with a portion of a third gland (biopsied). The fine structure of this gland indicates hyperplasia, and 19 months have elapsed, but the patient's chemistries are still quite normal. In patients with chief cell hyperplasia who are destined to develop recurrence, the period of time that elapses between the initial surgery and biochemical recurrence is highly variable. (In our experience, the range is from 40 days to roughly 4 years, and may be longer). There is insufficient information to date for an estimation of a period indicative of surgical cure. Thus, all of the patients in the current study are still liable to recurrence and will be for some time.

It was not possible to arrive at a meaningful comparison between the degree of activity of any patient's adenoma and the normal gland due to the difficulties in adequately sampling the former. There was no correlation between adenoma size and the ultrastructure of the small glands, nor did the degree of hypercalcemia, hypophosphatemia, or depression of TRP fit the hypothesis that the least active or normal glands should come from patients with the largest adenomas or most severe biochemical disease. The severity and duration of clinical symptoms did not appear to fit in this regard either, al-

though the vague nature of these symptoms and the small number of patients studied must be noted.

Application of electron microscopy to the differential diagnosis of parathyroid adenoma vs chief cell hyperplasia has only emphasized the difficulties involved. It appears that an adequate examination of several glands by light microscopy should prove as reliable as ultrastructural evaluation and certainly more practical. However, it is necessary to realize that hyperplastic glands may be of normal size and that the histologic evidences of hyperplasia may be subtle (reduced fat, nodules of chief cells, foci of abnormal cells such as the transitional chief and water clear cells, etc). This study further emphasizes the commonness of chief cell hyperplasia and, particularly, the concept that this form of hyperplasia easily and frequently masquerades as adenoma. It is surprising that of 11 patients with a firm diagnosis of parathyroid adenoma at the time of frozen section, only four have ultrastructural and clinical confirmation. Primary hyperplasia has become manifest in two patients, is probable in two others, and can not be excluded in the remaining three.

We have suspected that cases of double and triple adenoma are, in reality, examples of nodular chief cell hyperplasia. Furthermore, patients with a diagnosis of a single adenoma may not develop clinical recurrence until some years later or may have asymptomatic biochemical evidence of hyperparathyroidism. We have been impressed by the frequency with which biochemical hyperparathyroidism is asymptomatic or minimally (vaguely) symptomatic. Recurrence in such patients might go undetected for long periods of time, as would the true nature of their parathyroid disease. It may eventually develop that primary hyperplasia is more common than adenoma.

Periodic postoperative laboratory evaluation of all cases of hyperparathyroidism, no matter how satisfactory the early surgical result, seems indicated. Operative identification of four parathyroid glands in patients with this disease is also indicated, if possible, with excision of enlarged glands. If only one tumorous gland is present, at least one additional parathyroid gland should be removed for microscopic study. If hyperplasia is present or suspected, a third gland may be excised, and if hyperplastic, a portion of the fourth may be removed. Pursuance of this policy in several dozen cases has not resulted in iatrogenic hypoparathyroidism in this institution.

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(Figures 1 through 13 and the references may be seen in the original article.)

SECONDARY HYPERPARATHYROIDISM IN CHRONIC RENAL DISEASE

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Secondary hyperparathyroidism is a metabolic state characterized by an excessive but not autonomous rate of production of parathyroid hormone: this disorder is encountered invariably in chronic renal failure and also in other disease states where there is resistance to the metabolic actions of parathyroid hormone. The resistance to the biological effects of the hormone lead, through mechanisms as yet unclarified, to hyperplasia of the parathyroids. For many years secondary hyperparathyroidism had been postulated to be present in patients with chronic renal disease. It was known from postmortem studies of patients with renal failure that the parathyroids were hyperplastic; in addition, changes typical of

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osteitis fibrosa were found in many patients with far advanced renal failure, as discussed elsewhere in this symposium by Stanbury and others. Studies with the radioimmunoassay by Berson and Yalow, Reiss (reviewed in this symposium), and us have now confirmed that there is an increased concentration of circulating parathyroid hormone in patients with chronic renal disease. Many patients with chronic renal disease have a significant prolongation of life due to considerable success with programs of chronic hemodialysis or renal transplantation or both; however, numerous new clinical problems have appeared during the treatment of these patients. Thus, there are aspects of parathyroid gland activity in chronic renal disease that require detailed investigation and clarification. The radioimmunoassay for parathyroid hormone should be uniquely useful in the systematic study of the pathophysiology of secondary hyperparathyroidism in these patients. Of particular importance are the following problems: (1) the rate and degree of autonomy of parathyroid hormone secretion by the hyperplastic glands, (2) the stimulus for parathyroid gland hyperplasia and excessive hormone secretion in chronic renal failure, (3) the cause of the apparent resistance to the metabolic actions of parathyroid hormone that develops in chronic renal disease, (4) the hypercalcemia in patients with chronic renal disease and secondary hyperparathyroidism that is noted frequently following renal transplantation, (5) the appropriate therapeutic management of patients with chronic renal failure during dialysis or after transplantation or both.

In normal animals or humans the rate of parathyroid hormone secretion is inversely proportional to the degree of hypocalcemia; hypercalcemia causes suppression of parathyroid hormone secretion. In primary hyperparathyroidism, at least that due to adenomas of the parathyroids, the normal control of parathyroid hormone secretion by blood calcium is lost. Hormone secretion is completely autonomous; the gland produces an increased amount of hormone despite an increased blood calcium concentration. In marked contrast are findings in chronic renal disease and other forms of secondary hyperparathyroidism such as osteomalacia and pseudohypoparathyroidism. In these disorders, although the rate of hormone secretion is excessive and the concentration of hormone found in peripheral blood often exceeds that found in primary hyperparathyroidism, hormone secretion is not autonomous. Experimentally induced decrease or increase in blood calcium concentration will cause a prompt rise or fall, respectively, in parathyroid hormone concentration in blood (Tables 1 and 2). Hormone secretion can be completely abolished by increasing the calcium level above 12 mg/100 ml.

The exact mechanism of induction of parathyroid hyperplasia in chronic renal disease remains obscure. However, it has become clear that only with hyperplasia can the parathyroids maintain the greatly increased rates of hormone secretion that are found. The rate of new hormone biosynthesis appears to be nearly rate-limiting for hormone secretion in the normal animal or human. The greatest increase in hormone secretion observed with maximal hypocalcemic stimulation in normal cows is fivefold to sixfold. Hyperplastic parathyroids seem required to support the maximal rates of hormone secretion observed in secondary hyperparathyroidism, which are 50 to 100 times the normal rate of hormone secretion. With hyperplasia, there is then a sufficient increase in the number or the size of cells or both so that increased hormone biosynthesis can sustain vastly increased rates of hormone secretion. Trophic factors, as yet unrecognized, might be important in mediating this hypertrophy of the glands in the secondary hyperparathyroidism that develops in chronic renal failure. However, there is no direct evidence for such factors at the present time. It is possible that the chronic, only partially compensated, hypocalcemia characteristic of patients with resistance to the action of parathyroid hormone might itself be the only stimulus required for the development of secondary hyperparathyroidism.

Recently there has been considerable effort directed toward defining the etiology of the resistance to the metabolic actions of parathyroid hormone in the diverse clinical situations in which secondary hyperparathyroidism is encountered. Much has been learned about specific metabolic or biochemical deficiencies in osteomalacia, and pseudohypoparathyroidism as well as in chronic renal disease, which may help to explain resistance to the biological effects of parathyroid hormone. However, uncertainties persist about the relative importance and temporal relationship of metabolic deficiencies in these diseases. Impaired metabolism of vitamin D is encountered in chronic renal disease (as discussed elsewhere in this symposium by Avioli and Stanbury). The relative ineffectiveness of parathyroid hormone in the vitamin D deficient state in maintaining an adequate rate of bone resorption seems to be compensated for by greatly increased production of hormone. However, there is still much uncertainty about the sequence of metabolic deficiencies in chronic renal disease. It has not been established

TABLE 1.—*Effect of Alterations in Calcium Concentration During Hemodialysis on Parathyroid Hormone (PTH) Secretion in Patients With Chronic Renal Disease**

Patient	Time, hr	High Calcium		Low Calcium	
		Calcium (mg/100 ml)	PTH (mμg/ml)	Calcium (mg/100 ml)	PTH (mμg/ml)
1	0	9.8	2.0	10.0	2.0
	3	11.2	0	8.9	3.4
	6	10.5	1.6	9.2	2.6
2	0	10.1	2.4	10.2	2.0
	3	12.8	0	9.4	2.8
	6	10.8	2.4	10.1	2.4
3	0	9.2	7.0	9.9	6.4
	3	10.5	2.3	9.0	7.4
	6	9.5	5.3	9.8	5.2
4	0	10.3	1.2	10.2	1.0
	3	11.7	0	9.2	1.6
	6	11.5	0	10.0	1.2

* After dialysis with the usual calcium concentration in the dialysate (6.5 mg/100 ml), a high calcium (11.5 mg/100 ml) and low calcium (3.5 mg/100 ml) dialysate were substituted and dialysis continued for three hours. The usual dialysate fluid was then used and dialysis continued for three additional hours. Hormone and calcium concentrations were determined in blood samples taken at zero, three, and six hours.

TABLE 2.—*Fall in Basal Hormone Concentration in Blood After Renal Transplantation*

Patient	Plasma Parathyroid Hormone (mμg/ml)		
	Before Transplant	One Month After Transplant	% Decrease
1	2.3	1.4	39
2	2.8	0.9	68
3	3.0	1.0	67
4	3.4	2.0	41
5	4.1	2.6	37
6	5.0	3.2	36

whether impaired vitamin D metabolism and consequent hypocalcemia entirely account for the severe secondary hyperparathyroidism in chronic renal insufficiency. The bone lesions detected in this disease are quite varied. There is a tendency for osteomalacia to be prominent in patients with milder degrees of renal failure, but in advanced renal insufficiency patients may have osteitis fibrosa cystica indicative of excessive action of parathyroid hormone. There are impaired rates of bone resorption and a reduced intestinal absorption of calcium apparently as a consequence of vitamin D deficiency; these deficiencies may be invoked as the original stimulus for parathyroid hyperplasia. However, it is unclear what pathophysiological changes occur to lead late in the course of the disease to an increase in apparent effectiveness of parathyroid hormone on bone (development of osteitis fibrosa). No firm conclusions can be made at present about the nature of the metabolic deficiencies in chronic renal disease and their relationship to the development of secondary hyperparathyroidism. Extensive studies in patients with chronic renal disease will be required to explain the conflicting and changing patterns of calcium and bone metabolism and parathyroid hormone action.

With the recent increase in performance of renal transplantation in patients with chronic renal disease, it has been noted that in a number of patients, hypercalcemia develops in the postoperative period. This has led to speculation about the frequency of so-called tertiary hyperparathyroidism—that is, the development of autonomous hyperparathyroidism after long-standing secondary hyperparathyroidism. Autonomous hyperparathyroidism, or the alternate view that severely hyperplastic parathyroids are only partially suppressible, have both been invoked as the explanation of the persistent postoperative hypercalcemia in patients with chronic renal disease after transplantation. However, consideration of the mechanisms involved in secondary hyperparathyroidism gained through studies in animal models suggests an alternate, more likely explanation. Our present hypothesis is that hypercalcemia is an inevitable consequence of secondary hyperparathyroidism and excessive rates of hormone secretion (without implying autonomous gland function) if the resistance to the biological effects of the hormone abruptly disappears. This view becomes evident from findings based on radioimmunoassay studies concerning the quantitative abnormality in hormone production that is characteristic of animals with secondary hyperparathyroidism. In studies with the radioimmunoassay in normal and parturient cows, it was possible

to contrast carefully the relationship between parathyroid hormone and blood calcium concentration in states of normal gland function versus that in secondary hyperparathyroidism. The pattern of change in parathyroid hormone concentrations with changes in blood calcium concentration indicated an inverse linear relationship between the two variables. The changes in hormone concentration with calcium found in normal cows was sufficiently similar from one animal to another that the function represented by the single heavy line of Fig 2 could be derived from data from all animals. A different slope for each animal was found necessary with secondary hyperparathyroidism. In addition, the slope of the response was greater in the animals with secondary hyperparathyroidism; the steepest slope (uppermost line of Fig 2) was eightfold greater than the slope of response in normal animals. In secondary hyperparathyroidism hormone production is still under the control of blood calcium; hormone secretion is completely abolished by blood calcium concentrations above 12 mg/100 ml. However, excessive amounts of hormone are produced at every concentration of blood calcium throughout the physiological range. In the cows it was also shown that the hyperplastic glands return to their previous normal mass and state of function once resistance to the action of parathyroid hormone has been removed. However, several months are required for this involution of the hyperplastic parathyroid glands. Preliminary studies show that the same adaptive changes in gland function occur in man in secondary hyperparathyroidism. Serial measurements of hormone concentration in blood in patients with chronic renal disease following successful renal transplantation indicate a gradual reduction in baseline hormone secretion over a period of several months; this is consistent with a slow involution of hyperplastic glands (Table 2).

If, as is believed, restoration of renal function after successful renal transplantation is accompanied by a rapid disappearance of resistance to the action of the hormone, the persistent excessive rates of basal hormone secretion characteristic of hyperplastic glands can lead to excessive hormonal effects and hypercalcemia. In fact, it might be argued that hypercalcemia should develop in all such patients. However, we really know very little about the metabolic deficiencies in chronic renal disease and the changes that accompany successful renal transplantation. Many factors might prevent the development of hypercalcemia. These include (1) a partial or only slowly progressive disappearance of resistance to the action of the hormone in some patients despite transplantation; (2) rapid deposition of calcium into unmineralized osteoid; or (3) the relative success of compensatory mechanisms such as increased production of endogenous thyrocalcitonin.

The view that hypercalcemia may be a transient phenomenon reflecting slow parathyroid involution has important therapeutic consequences in the management of these patients. It probably is unnecessary to perform parathyroidectomy in many patients despite the development of transient hypercalcemia if appropriate tests confirm responsiveness of the parathyroids; calcium infusion can be used to test suppression of hormone secretion (Table 1). If true autonomous hyperparathyroidism has actually developed in a given patient, this can be detected by a failure to observe suppression of hormone secretion.

Detailed study will be necessary to establish the validity of these concepts of parathyroid gland function in chronic renal disease. Certain potential problems in application and interpretation of the radioimmunoassay in patients with chronic renal disease will require clarification. If the parathyroids, however, are undergoing involution, temporary medical management of the hypercalcemia with calcitonin or other agents may be sufficient; permanent surgical hypoparathyroidism may thereby be avoided.

(Figures 1 and 2, the references and discussion may be seen in the original article.)

EYE INJURY CAUSED BY TEAR-GAS WEAPONS

Robert A. Levine, Captain (MC) USA, and Charles J. Stahl, Commander (MC) USN, Washington, D.C. *Amer J Ophthal 65(4):497–508, April 1968.*

The potential hazard to the eye from tear-gas weapons has not been fully appreciated. Scattered reports in the ophthalmic literature have mainly emphasized that the occurrence of such eye damage is rare and temporary and that full recovery should be anticipated. The great popularity of all sorts of tear-gas devices reflects this attitude.

From the Armed Forces Institute of Pathology.

Possession of the tear-gas pen has become particularly common, the purchase often being prompted by a need for a concealable, inexpensive weapon for self-defense. This need is quickly answered because tear-gas pens often can be purchased at the nearby drugstore or through a mail-order house. The availability of tear-gas pens also reflects the notable absence of laws controlling the sales of these items to the public. In fact, sales and possession of tear-gas pens are controlled mainly in New York, Illinois and California. Not surprisingly, therefore, the newspapers sporadically report the misguided use of a tear-gas weapon by some misinformed and often irresponsible individual.

We reviewed the cases on file in the Armed Forces Institute of Pathology (AFIP) involving eyes that had been enucleated following an injury by a tear-gas weapon, considering the following points: (1) the medical literature does not emphasize the potential of a tear-gas weapon to produce permanent sequelae, and, indeed, only four cases have been described in which enucleation followed such injury; (2) the public and legal authorities regard exposure to tear-gas only in terms of its transient incapacitating effects; and (3) because of its indiscriminate and widespread distribution among civilians, it is likely that injuries of the eye from tear-gas weapons will be more frequently encountered in the future.

The blast from a tear-gas weapon, such as a tear-gas pen, has three components: the propellant, the wadding, and the chemical agent. The propellant usually is a primer, gunpowder, or both, which generates the explosive charge that drives the tear gas from the cartridge. It therefore becomes part of the blast. The wadding is the disc that seals the outlet of the cartridge and may be made of rubber, cardboard, or synthetic material. Fragments of wadding also join the blast. The third component of the blast is the tear gas itself, and in most pens the chemical agent is in the form of a fine powder. Upon firing, a suspension of fine particles results, similar to an aerosol. Complete gaseous transformation may occur when the particles of the chemical agent become embedded in tissues, which may produce crepitation.

Because of these various components, as well as the force of the blast, it is not strictly correct to refer to these cases as tear-gas injuries. Many factors other than the tear gas, per se, may play a role in damaging the tissues. More precisely, these eyes have been damaged by a tear-gas weapon of which the tear gas is only one of the potentially injurious factors.

Review of Cases

Our review of material from the files of the Armed Forces Institute of Pathology revealed that 14 eyes of 13 men required enucleation following injury by a tear-gas weapon (table 1). One of these cases (AFIP 1222899) has been described previously. There were no cases involving women or children. Two of the men were soldiers at the time of injury, although in neither case was the injury sustained in combat or in training maneuvers. In most instances the tear gas was discharged into the patient's face while he was examining a tear-gas device, during an altercation, or while being apprehended by a law-enforcement officer. Many of the histories were incomplete, but in roughly half of the cases the injuries were self-inflicted and accidental. In the remaining half, the weapon was fired by a second person with the intent to injure or disable.

The clinical and pathologic observations could be divided into two groups, according to time of enucleation: five eyes exhibiting acute changes were enucleated within two months after injury; nine eyes with chronic changes were enucleated from eight months to 15 years after injury.

During the acute period the clinicians referred to the patients' intense ocular pain and described the corneas as being opaque, scarred, vascularized, and/or ulcerated. The contents of the anterior chamber were usually noteworthy, including pus, fibrin, blood, and/or debris. In a few cases glaucoma was apparent clinically. Since the ocular media were too opaque to permit ophthalmoscopic examination, the posterior segment was not described in any case.

Microscopic examination of the five eyes enucleated during the acute period invariably revealed an intense, suppurative, necrotizing keratitis (figs. 1 and 2). The deeper aspects of the cornea often exhibited areas of coagulative necrosis (fig. 3), seen as zones of acellularity and total loss of keratocytic nuclei. These corneal changes were accompanied by a marked suppurative iridocyclitis, the anterior chamber usually being filled with pus and hemorrhagic debris. Organization of this inflammatory material was associated with shallowing of the anterior chamber, formation of retrocorneal membrane (fig. 4), and obliteration of the chamber angle by peripheral anterior synechias (fig. 1). In one case (fig. 5, not shown), retrodisplacement of the iris root and a portion of the ciliary body was indicative of a concurrent contusion deformity of the chamber angle.

In another instance the superficial cornea was thickened and replaced by a mantle of granulation

TABLE 1.—*Circumstances of Injury, Clinical Observations, and Microscopic Findings in 14 Eyes Enucleated from 13 Men Following Injuries by Tear-Gas Weapons*

Case Number	AFIP Accession	Age at Injury (Yr)	Interval Between Injury and Enucleation	Circumstances of Injury	Clinical Observations	Microscopic Findings
1	67918	58	3 wk	Explosion of tear-gas gun	Vascularized, opaque cornea; secondary glaucoma	Suppurative and coagulative corneal necrosis; fibrinopurulent iridocyclitis; hypopyon; postinflammatory closure glaucoma
2	194376	22	1 mo	Tear-gas burn of eyes, bilateral	Conjunctival scarring; scarred, ulcerated corneal hypopyon	Suppurative corneal necrosis; early retrocorneal membrane; suppurative iridocyclitis; hypopyon; contusion-angle deformity with peripheral anterior synechias; scleritis
3	220075	24	1 mo	Tear-gas pen accidentally discharged while patient was examining it	Symblepharon; vascularized, cloudy cornea; exudate in anterior chamber	Superficial corneal vascularization; deep corneal coagulative necrosis; iris necrosis with occlusion of anterior chamber; anterior subcapsular cataract
4	534686	52	1 mo	Tear-gas gun fired into face by night watchman	Atrophic and gangrenous eye	Necrotic defect in cornea and sclera; partial loss of intraocular contents; granulomatous endophthalmitis secondary to foreign bodies; massive intraocular hemorrhage
5	1222899*	38	2 mo	Shot in face with pocket tear-gas gun during quarrel.	Ground-glass cornea; corneal blood staining; anterior chamber filled with blood and fibrin.	Massive necrosis of anterior segment
6	633977	58	8 mo	Shot in face with some type of tear-gas gun	Corneal vascularization; fibrinous iritis; glaucoma	Superficial corneal vascularization; indolent perforating corneal ulcer; iris necrosis with occlusion of anterior chamber; suppurative and nongranulomatous iridocyclitis; vitreal and suprachoroidal hemorrhage
7	516480	29	22 mo	Tear-gas shell exploded in face	Corneal vascularization and scarring; glaucoma	Corneal vascularization, old; postnecrotic scarring of iris and ciliary body; perforating limbal wound with ruptured lens capsule (?accidental, ? surgical); hypotony, chronic.
8	570258	33	3 yr	Tear-gas bomb exploded while being examined	Vascularized, opaque, ulcerated cornea; hypotony	Diffuse suppurative keratitis; shallow central corneal ulcer; dense superficial pannus; retrocorneal membrane
9	306110	30	3.5 yr	Rowdy in bar and bartender fired tear-gas pen into victim's face	First-and-second-degree facial burns; ulcerative keratitis and descemetocele with chronic perforation and uveal prolapse	Suppurative keratitis; indolent perforated corneal ulcer; obliteration of anterior chamber; necrotic remains of iris and lens
10	108213	29	6.5 yr	Tear-gas burn of eyes	Opaque cornea; questionable old perforation	Retrocorneal membrane; contusion-angle deformity; peripheral anterior synechias
11	216967	20	6.5 yr	Shot in face with tear-gas pistol during altercation	Vascularized and scarred cornea	Corneal scarring, old; retrocorneal membrane; corneal perforation, recent expulsive hemorrhage, recent
12	208893	43	12 yr	Tear-gas gun accidentally discharged into face	Opaque corneas with perforating ulcers	OS Corneal vascularization and scarring; indolent perforating corneal ulcer with epithelial ingrowth; suppurative endophthalmitis; retinal and choroidal detachments

* Case reported by Oaks and co-workers.

TABLE 1.—*Circumstances of Injury, Clinical Observations, and Microscopic Findings in 14 Eyes Enucleated from 13 Men Following Injuries by Tear-Gas Weapons*

Case Number	AFIP Accession	Age at Injury (Yr)	Interval Between Injury and Enucleation	Circumstances of Injury	Clinical Observations	Miscroscopic Findings
					OD	Corneal vascularization and scarring; indolent perforating corneal ulcer with epithelial ingrowth; suppurative endophthalmitis; proliferative retinopathy; choroidal and retinal detachments; sclerochorio-retinal scarring
13	158742	19	15 yr	Tear-gas pen accidentally discharged into face	Staphyloma with chronic rupture	Suppurative keratitis with ring ulcer; suppurative endophthalmitis; suppurative necrosis of iris and ciliary body; retinal and choroidal detachments

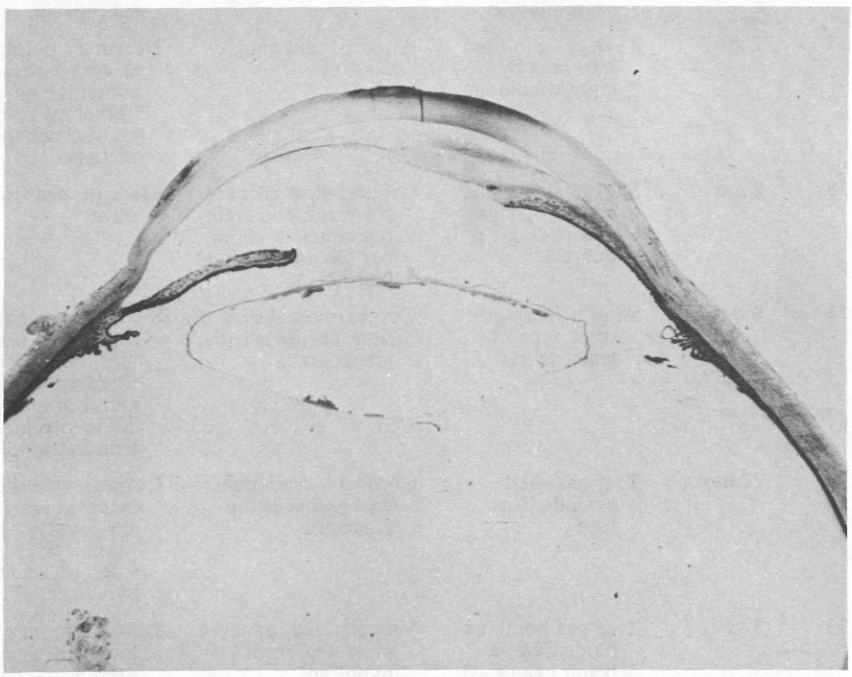

Fig. 1 (Levine and Stahl). Case 2. Acute suppurative keratitis with organizing fibrinopurulent exudate in anterior chamber. Note angle closure inferiorly (right) and angle recession superiorly (left). (Hematoxylin-eosin, X8; AFIP Neg. 56–22832.)

tissue (figs. 6 and 7). More commonly, however, in most eyes enucleated during the acute period, the reparative properties of granulation tissue could not compensate for the intense corneal necrosis. Therefore, acute corneal ulcers were seen in various stages, and in the most extreme case a huge perforating defect (figs. 8 [shown here] and 9 [not shown]) was present in the cornea and adjacent sclera with prolapse and disorganization of the intraocular contents. This case was of particular interest because, in addition to the intraocular retention of foreign material (fig. 10, not shown) with a granulomatous endophthalmitis, there were numerous nonvascular cystic spaces within the granulation tissue that filled the anterior segment. These spaces may represent the sites where penetrating particles of the chemical agent had undergone vaporization. In the absence of corneal perforation the posterior segment was often unremarkable except for the occasional presence of mild papilledema.

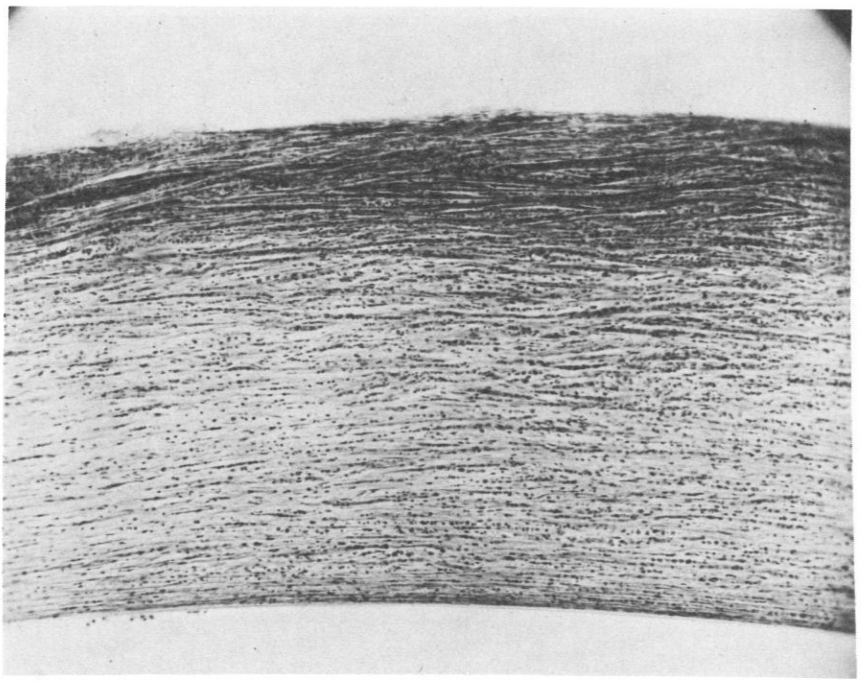

Fig. 2 (Levine and Stahl). Case 2. Acute suppurative keratitis. (Hematoxylin-eosin, X125; AFIP Neg. 07092.)

The nine eyes enucleated eight months to 15 years following injury could be differentiated from the previous group by their clinical and microscopic findings. Although one eye was enucleated following a perforating limbal wound and another because of accidental perforation during lamellar keratoplasty,

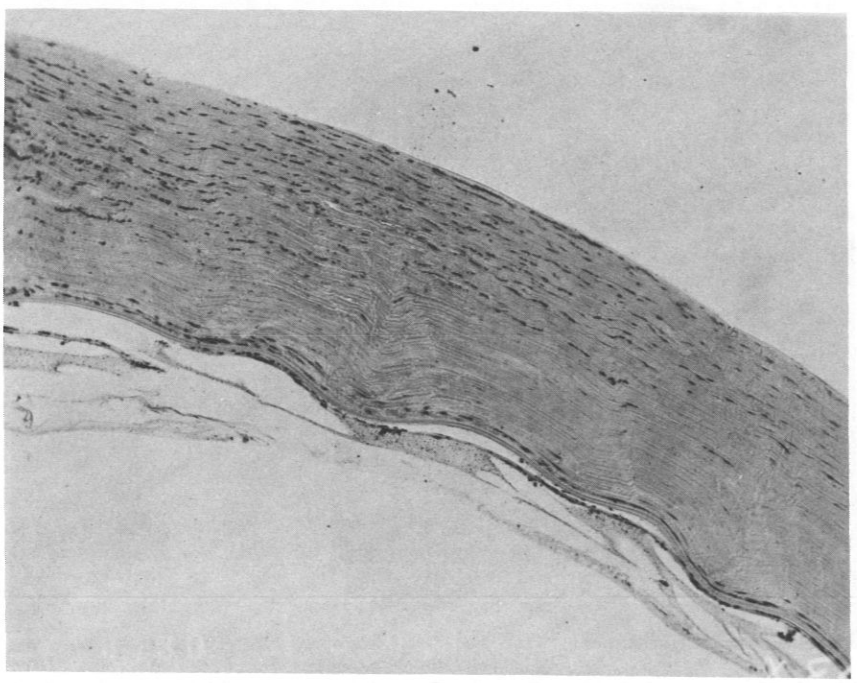

Fig. 3 (Levine and Stahl). Case 1. Coagulative necrosis of deep corneal stroma underlying area of diffuse infiltration by neutrophils; tenacious fibrinous exudate in the anterior chamber. (Hematoxylin-eosin, X80; AFIP Neg. 67–3130.)

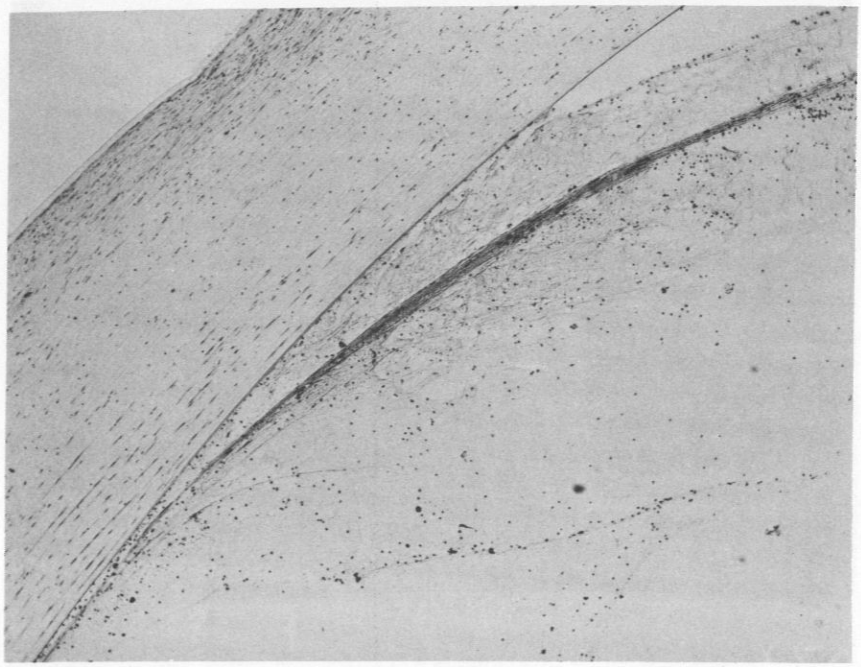

Fig. 4 (Levine and Stahl). Case 2. Organizing fibrinopurulent exudate in anterior chamber. (Hematoxylin-eosin, X50; AFIP Neg. 67–3137.)

the remaining eyes were enucleated as elective procedures, because they were blind, unsightly, and exhibited a vascularizing keratitis, often with ulceration and recurrent perforation.

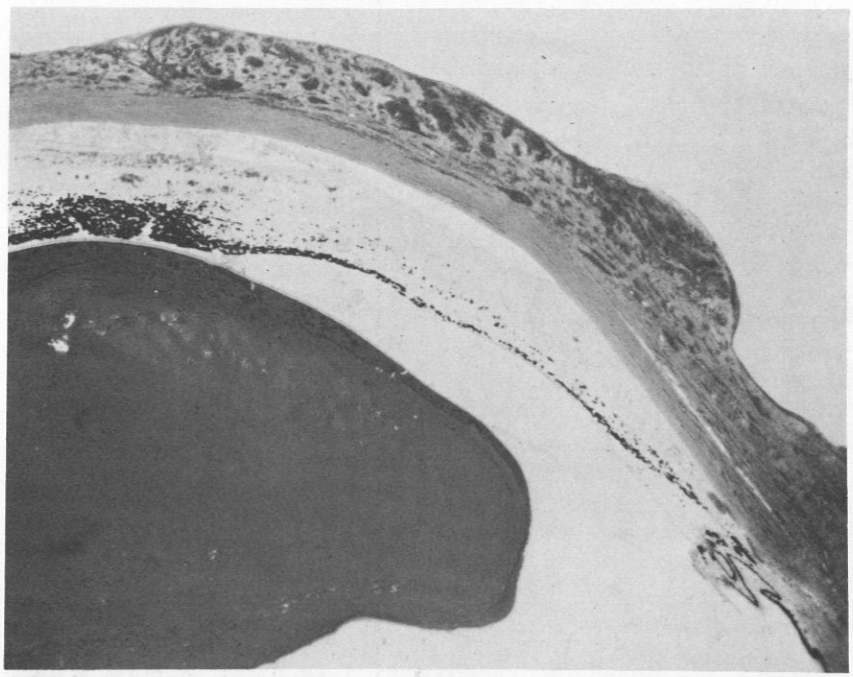

Fig. 6 (Levine and Stahl). Case 3. Granulation tissue thickens and replaces the cornea superficially. There is extensive necrosis of the iris and ciliary body with shallowing of the anterior chamber and obliteration of the chamber angle. (Hematoxylin-eosin, X20; AFIP Neg. 67–3145.)

Fig. 7 (Levine and Stahl). Case 3. Granulation tissue thickens and replaces the cornea superficially, while a broad zone of coagulative necrosis is present throughout the underlying corneal stroma. (Hematoxylin-eosin, X80; AFIP Neg. 67–3143.)

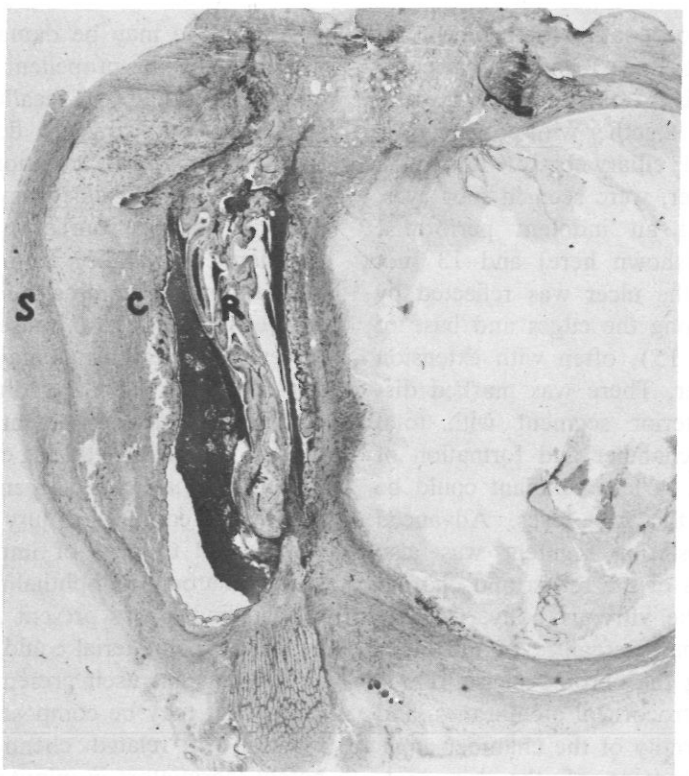

Fig. 8 (Levine and Stahl). Case 4. Massive necrosis of anterior segment with disorganization of intraocular contents. Sclera (S) choroid (C) and retina (R). (Periodic acid-Schiff, X6; AFIP Neg. 67–3153.)

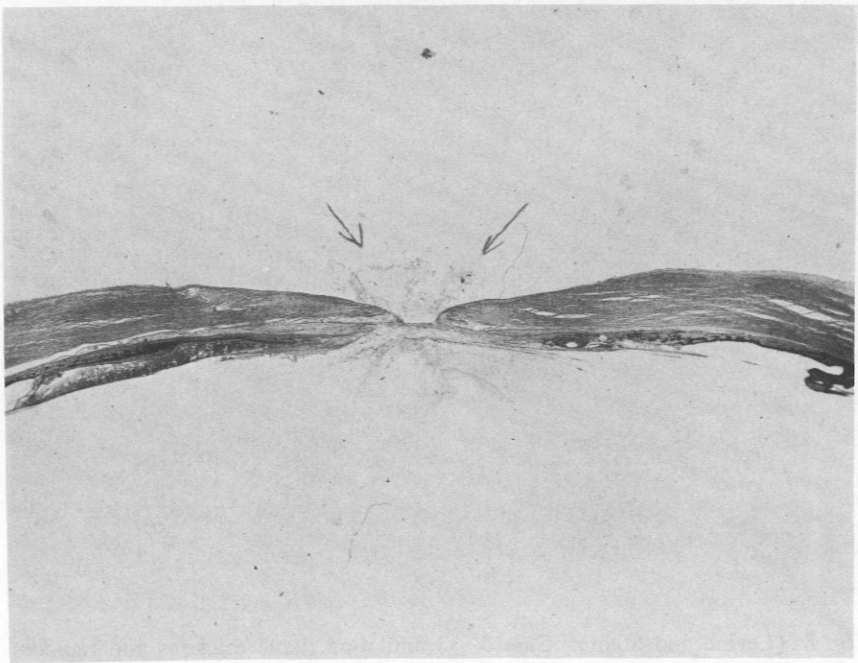

Fig. 12. (Levine and Stahl). Case 9. Arrows indicate an area where the extremely thin ulcerated cornea has perforated, leading to a collapse of the anterior chamber. (Hematoxylin-eosin, X10; AFIP Neg. 67–3146.)

Microscopic examination confirmed these clinical observations (fig. 11, not shown) and also revealed an associated iridocyclitis of the suppurative and nongranulomatous variety together with post-necrotic scarring of the iris and ciliary body. The most dramatic changes, however, were seen in four eyes, each of which revealed an indolent perforated corneal ulcer (figs. 12 [shown here] and 13 [not shown]). Chronicity of the ulcer was reflected by epithelial proliferation along the edges and base of the defect (figs. 14 and 15), often with extension into the anterior chamber. There was marked disorganization of the anterior segment with total collapse of the anterior chamber and formation of broad anterior synechias. A lens remnant could be found in only one of the four eyes. Advanced degeneration of the posterior segment was also present, with detachments of the retina and choroid and vascularization of the vitreous body. Chronic corneal perforation was not a feature of the other five eyes removed during the chronic phase. Three of these eyes exhibited retrocorneal membranes, and one had an obvious deformity of the chamber angle with typical retrodisplacement of the iris root, caused by contusion.

Comment

A tear-gas weapon presents several dangers to the eye. The eye may be damaged by the shock force generated by the propellent charge for the chemical agent. It should be recalled that two enucleated specimens had obvious deformities of the angle from contusion. In addition, the burning residues of gunpowder or primer may strike the eye, inflicting a burn. Another source of damage consists of the fragments of wadding from the tear-gas pens. Metallic fragments from certain tear-gas munitions such as grenades may also cause injuries. Upon striking the eye, these fragments may be particularly destructive because they are often saturated with the chemical agent. Experimental studies have revealed the remarkable penetrating capacity of the wads from a conventional tear-gas pen, and in Case 5 it was felt that a contusive injury above the afflicted eye represented the site of impact of the wadding. A granulomatous endophthalmitis caused by retained foreign bodies was present in Case 4, but the exact nature of the material could not be determined.

The tear gas itself presents the greatest hazard to the eye. It may be composed of any one or a combination of related chemicals, all of which are potent lacrimators in minute concentrations. Chloroacetophenone (CN), the most common, is usually present within the cartridge as a micropulverized powder that, upon firing, becomes a mist of finely suspended particles. Aging alters the physical char-

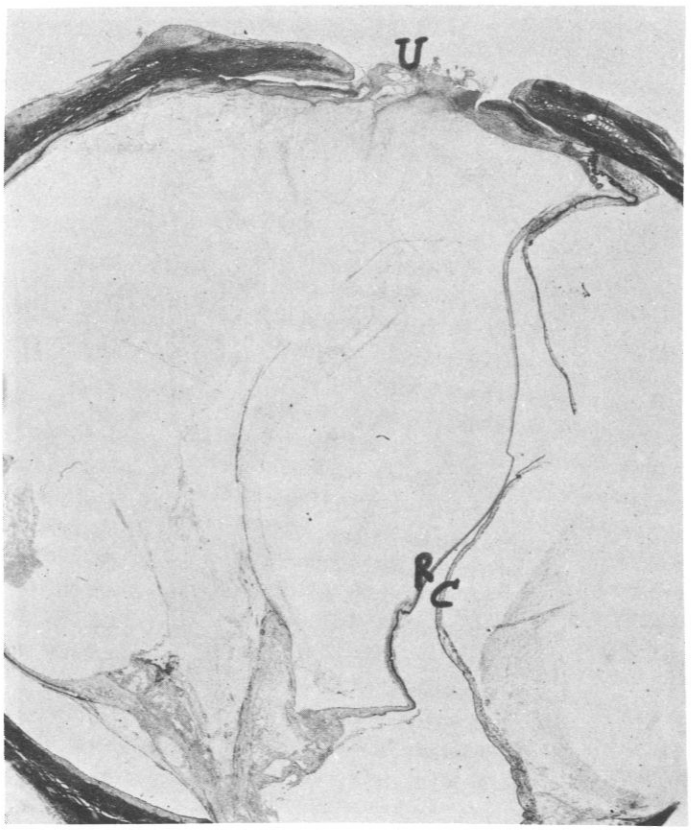

Fig. 14 (Levine and Stahl). Case 12. Perforated corneal ulcer (U) with collapse of the anterior chamber, detachment of the retina (R) and choroid (C) and vascularization of the vitreous body posteriorly. (Hematoxylin-eosin, X6; AFIP Neg. 67–3139.)

acteristics of the chemical, with a tendency to form clumps or a solid mass. When expelled as a solid mass, the material acts as a low-velocity missile, and by this means physical and mechanical factors may augment the inherent destructive capacity of the chemical. These factors probably explain how in one reported case the chemical agent penetrated the orbit, leading to a relentless necrosis of the orbital and facial bones.

Attention has been drawn recently to the particular neurotoxic potential of CN. This report described three persons injured by accidental discharge of tear-gas pens into their hands. Following the injury there was prolonged and sometimes permanent anesthesia of portions of the hands and fingers. Microscopic examination revealed marked thickening of the epineurium and loss of axis cylinders.

These morphologic observations are consistent with earlier biochemical studies, showing that CN reacts selectively with free sulfhydryl groups in proteins, causing an irreversible inhibition of enzymes containing sulfhydryl groups. The chemical action results particularly in denaturation of enzymes associated with sensory nerve activity.

This neurotoxic capacity may explain the unusual finding that half of the enucleations in this series were performed three or more years after the original injury and that histologic examination of these perforating corneal ulcerations indicated they had persisted for an inordinately long time. It is very likely that these eyes, initially not damaged sufficiently to cause prompt enucleation, go on to develop neuroparalytic keratopathy with its sequelae. Similar observations have been made clinically.

Summary

This article reports findings from a study of 14 eyes enucleated following injury by a tear-gas weapon. Five of the eyes were removed shortly after injury, revealing necrosis of the anterior segment, an intense necrotizing keratitis of varying degree,

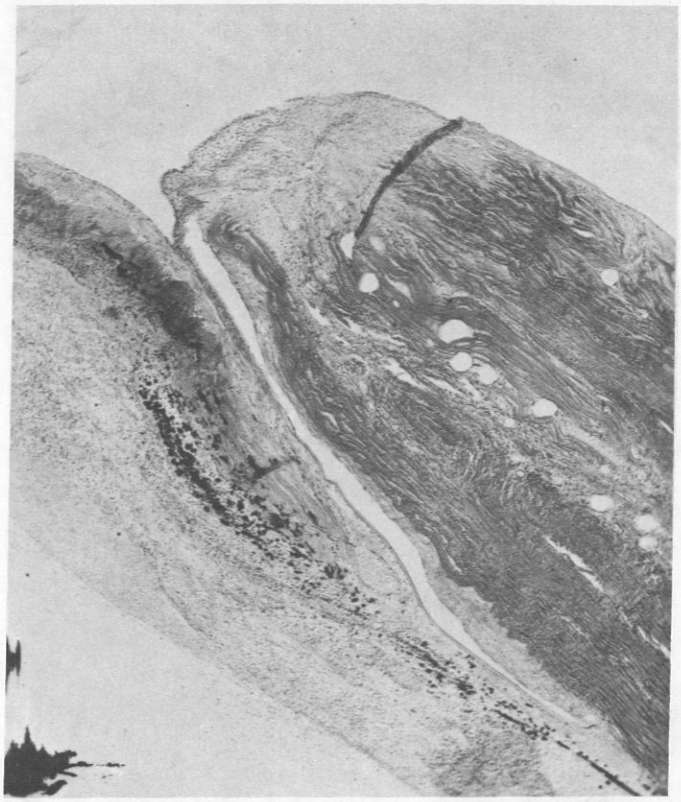

Fig. 15 (Levine and Stahl). Case 12. Proliferation of epithelium over edge of ulcer with extension along the posterior surface of the cornea. (Hematoxylin-eosin, X50; AFIP Neg. 67–3140.)

and an associated suppurative iridocyclitis. Undoubtedly these changes represented the acute chemical damage of tear gas. The after-effects of the changes could be seen in several eyes that showed retrocorneal membranes and obliteration of the anterior chamber and chamber angle.

The remaining nine eyes were enucleated up to 15 years following injury, and the findings in these chronic cases can best be attributed to the sequelae of neuroparalytic keratopathy, probably related to the neurotoxic effects of tear gas. Another noteworthy finding was the presence of postcontusion deformities of the chamber angle probably caused by the effect of the blast or perhaps by fragments striking the eye.

Various features of the tear-gas weapon, such as the blast force, the propellent charge, the wadding, and age of the cartridge, in addition to the chemical agent itself, should be considered in evaluating such eyes either clinically or microscopically.

(Figures 5, 9, 10, 11, 13 and the references may be seen in the original article.)

TRANSSEXUALISM—PROBLEMS IN TREATMENT

LCDR Howard J. Baker, MC USN, Amer J Psychiat 125(10):1412–1418, April 1969.

Problems in the treatment of transsexualism, a unique disorder of psychosexual orientation, stem in part from physicians' difficulty in differentiating between it and other psychosexual disorders with similar features and from the physicians' unsympathetic attitudes. The author cites studies indicating that traditional psychotherapies have been unsuccessful in altering gender identity once it is established and

Read at the 124th annual meeting of the American Psychiatric Association, Boston, Mass., May 13-17, 1968.

At the time this study was done, LCDR Baker was with the Gender Identity Research Clinic (with which he is still affiliated), University of California at Los Angeles, School of Medicine. He is now with the U.S. Naval Hospital, Corpus Christi, Tex. 78419. The opinions and assertions contained herein are those of the author and are not to be construed as reflecting the views of the Navy Department or the naval service at large.

points out the general success of the sex-conversion operation.

Transsexualism is a condition characterized by the feeling that one belongs to the sex opposite that to which he or she has been assigned. Individuals so afflicted often go to great lengths in order to become more like the sex they psychologically feel they belong to. This quest has been regarded by some as a counterphobic defensive pattern against castration anxiety. Traditional psychotherapies have been totally unsuccessful in their attempt to resolve the conflicts that supposedly underlie the symptom in adults. Moreover, in the past several years there has been an accumulation of data that raise considerable doubt that the condition is indeed a counterphobic defense in patients whom I would define as being transsexuals. Current research impetus in this field occurred following the report by Hamburger and associates of surgical and hormonal sex reassignment of a male transsexual.

This latter form of treatment has and is being decried by learned members of the psychiatric community. They raise certain ethical, moral, legal, and theoretical objections that cannot be regarded lightly. The purpose of this paper will be to discuss transsexualism, with particular emphasis on problems in treatment, based on information from the literature, the experience of the UCLA Gender Identity Research Clinic, and my personal beliefs. These beliefs are derived from my participation in the proceedings of the clinic during the last three years as well as from my association with Dr. Robert J. Stoller.[1] I will deal almost exclusively with male transsexuals because of limited experience with female transsexuals. However, certain principles may be applicable to both. Unless it is stated otherwise, I will use the term "transsexual" in reference to men only.

Problems in Treatment

Differential Diagnosis and the Nature of Transsexualism. It may seem peculiar to many people to find "diagnosis" as the initial category for discussion under problems in treatment. However, the inability to establish the correct diagnosis in transsexualism, as in numerous other disorders, precludes any possibility for adequate treatment. The most common diagnosis one encounters in such cases is transvestism. This is truly unfortunate because the theoretical foundation upon which the treatment plan is based is thus most often in error.

[1] Dr. Stoller deserves considerable credit for having greatly clarified the confusion surrounding the disorders of male psychosexual orientation. I am most indebted to him as the source of much of the theoretical information contained in this paper.

Transsexualism, as noted earlier, is a condition characterized by the feeling that one belongs to the sex opposite that to which he or she has been assigned. This cardinal feature underlies this unique clinical entity and ultimately forms the basis by which to differentiate this disorder from other conditions. There are three conditions with which transsexualism shares certain features and from which differentiation is required: effeminate homosexuality, transvestism, and biological intersex. These entities encompass the entire spectrum of disorders of male psychosexual orientation if they are viewed along a continuum. Excellent historical reviews by Lukianowicz and by Pauly have provided us with an overview of the evolution of the many terms that have been used to designate these disorders. These synonyms are purposely omitted from this paper in order to avoid adding unnecessary confusion.

The three conditions in the differential diagnosis may be considered from the point of view of the features they may share in common with transsexualism: cross-dressing, feminine appearance or behavior, sexual relations with members of the same anatomic sex, and a desire for sex-transformative surgery.

The effeminate homosexual differs from the transsexual in several ways. Although he may cross-dress, he does this in order to enhance his sexual pleasure. He does not cross-dress as the transsexual does in order to feel more "natural." Even when cross-dressed, he feels himself to be a male. His feminine behavior demonstrates mimicry and hostility and lacks the naturalness of the transsexual. He considers his sexual interest to be homosexual because he considers himself to be a male. He enjoys his penis and derives pleasure from the interest other homosexuals may show toward it. Pauly has suggested the term "pseudotranssexual" to designate the small percentage of men who request sex-transformative surgery in order to justify their homosexuality.

According to Stoller, transvestism is a condition that is found only in males and is characterized by a compelling desire to wear female clothing because it is sexually exciting. A person's history of a single episode of cross-dressing in association with sexual arousal is regarded as sufficient to exclude the diagnosis of transsexualism at the UCLA Gender Identity Research Clinic. Fetishism implies castration anxiety, and the evidence for this in the literature as well as in patients I have seen is irrefutable. Transsexuals never become sexually excited as a result of cross-dressing. Benjamin has emphasized this differ-

ence between the two disorders, and Stoller has postulated theoretical explanations for it.

Transvestites may or may not have sexual relations with members of the same anatomic sex. When they do so, these relations are usually characterized for them much as I have characterized them for the homosexual. Transvestites are most often quite masculine in their behavior, appearance, and orientation. Although they comprise a rather large percentage of those seeking sex-conversion surgery, these individuals actually represent a relatively small percentage of the transvestite population in general.

The biological intersex has been described previously and in detail. The disorder includes such conditions as Klinefelter's syndrome, Sertoli-Cell-Only syndrome, and congenital hypopituitarism. Suffice it to say here that the biological intersex may present a clinical picture almost indistinguishable from the other entities. These persons have a demonstrable biological abnormality that overrides the usual environmental causes of gender identity. Although there is no valid estimate of the frequency of these people within the general population, it is likely that they occur at a much lower frequency than transsexuals, who are admittedly uncommon.

Transsexualism is related to but distinct from the entities described. It is unique unto itself. The inability to make this differentiation has resulted in such misconceptions as "a transvestite may become acutely disturbed (usually under the impact of some 'sensational' literature), turns, as it were, malignant, and degenerates into a full blown picture of transsexualism with its gloomy prognosis". Staphylococcal pulmonary abscesses share features in common with tubercular abscesses, but they differ in etiology, quality, and treatment, and, moreover, neither results from the progression of the other. The same may be said for the relationship of transvestism to transsexualism.

There is now good evidence that transsexualism has a unique etiology as a clinical entity. Stoller has elaborated on several factors in the history that are most often obtainable from male transsexuals but never from transvestites. These include excessive contact with and gratification by the mother, a peculiar bisexuality on the part of the mother, no divorces by the parents of these persons in spite of astonishingly empty marriages, a dynamically absent father, and unusual permissiveness.

Thus transsexuals differ from the other groups by their unique history, the nature of their femininity, the fact that they cross-dress strictly for nonerotic reasons, and because they may have sexual relations with members of the same anatomic sex but do so because they feel themselves to be women, preferring "straight" nonhomosexual men and abhoring any interest that their partners might show in their genitals. Last but foremost, they feel that they belong to the female sex. In light of the foregoin it is clear that to define as transsexual anyone who desires sex-transformation surgery is no longer justified. Such a classification lacks specificity and lumps together several disorders.

Generally, then, with the foregoing principles in mind, establishing the proper diagnosis becomes less difficult. The only patient who may present a problem is the transvestite who may request sex-transformative surgery and who may appear very feminine and state that he feels he is a woman. Typical of these is the subject reported by Greenberg and associates. Pauly's series is also of interest. Of the 100 transsexuals he studied, 43 had been married, and 24 of these had had children. While marriage does not exclude the possibility of transsexualism, it does greatly reduce the likelihood of such a diagnosis. Furthermore, transsexuals regard sexual relations with women as being homosexual, and most report that the idea is highly repulsive to them. Certainly the fact that 24 percent of Pauly's subjects had had children strongly suggests that many, if not all, of these persons were probably not transsexuals.

Several factors should be considered in order to differentiate the transvestite who resembles the transsexual from the transsexual. Among these are: 1) a history devoid of those elements elaborated upon by Stoller, which probably are etiological in the disorder; 2) the relatively late (early teens or later) development of the feeling that the individual belongs to the female sex; 3) fetishistic cross-dressing at any time; 4) sexual relations with a member of the same anatomic sex in which the patient fantasies himself to be a male, derives pleasure from the attention his partner displays toward his genitals, or takes the active (not aggressive) role; 5) history of normal heterosexual relations; 6) the tendency to occupy the male role, including profession, by choice (as opposed to doing so out of fear of the consequence of being discovered); and 7) the inability to pass as a female. Of these, the history of fetishistic cross-dressing should be considered as being pathognomonic of transvestism, while the others are only strongly suggestive and must be weighed carefully.

Physicians' Attitudes

Strangely, at this time the physician's attitude is presenting a more profound impediment to the

effective treatment of the transsexual than is the lack of applicability of any particular modality. In reviewing the letters from 465 men and women who desired a change of sex, Hamburger in 1953 stated:

these many personal letters from almost 500 deeply unhappy persons leave an overwhelming impression. One tragic existence is unfolded after another; they cry for help and understanding. It is depressing to realize how little can be done to come to their aid. One feels it a duty to appeal to the medical profession and to the responsible legislature: do your utmost to ease the existence of these fellowmen who are deprived of the possibilities of a harmonious and happy life—through no fault of their own.

How have we in the medical profession responded to Hamburger's legitimate plea? Empathically, with compassion and understanding? Hardly. Instead, we have driven these individuals into the hands of unscrupulous men because we hate them and have treated them accordingly, with contempt and disdain.

Transsexuals' claims of having felt as if they were girls for as long as they could remember, of having played only with girls and girls' toys, and of having lived in the girl's role—claims that have been verified in work with children—have been labeled as, or implied strongly to be, dishonest. Of the transsexual's desire to physically become a female, one writer states, "The incessant progress of these emotionally overvalued ideas resembles the relentless development of delusions in paranoia". He goes on: "They molest their doctors (often using threats of suicide), demanding to have a conversion operation." Do those afflicted with cataracts who hope to see again molest their doctors?

Northrup describes transsexualism as a "quasidelusional defense" against psychosis, "a patient's delusion". For those who accept the transsexual as being just that, he states that "this may therefore be considered a small-group example of the projection of psychotic trends into the group." Others, implying that transsexuals must indeed be psychotic, have reported that "although the subjects of this research are not clinically psychotic in any ordinary sense of the word, and we have yet to encounter any who have had psychiatric hospitalization, they are going around literally beseeching anyone to completely destroy their sexual organs".

We also find in the literature such terms and phrases as "psychotic delusional conviction," "psychopath," "delusional quest," "masters of the art of self-deception and of deceiving others," "psychopathic personality," "paranoid," "neurotic," "schizophrenic," "borderline psychotics," "intricate suicidal dynamics," and "so-called transsexuals," all of which amounts to little more than psychiatric name-calling and contributes little to our understanding of the disorders.

However, it is interesting that it is not only the transsexual who is the object of this ire. Meerloo, in referring to what he deems to be the "so-called Gender Identity Clinic," where "the project of sex-reassignment has been launched with all the paraphernalia and fanfare of 'scientism'," states, "indeed, it seems that foundation money is preferably granted to mechanical thinking rather than in praise of common sense". Ostow, Gutheil, Lukianowicz, and Stafford-Clark also chastise physicians who seek to ease the agony of transsexuals by granting their request.

Two reports by Green and co-workers dealing with questionnaires submitted to psychiatrists, gynecologists, urologists, general practitioners, and certain deviant groups and a third report by Green dealing with those groups are of interest. While they caution against the pitfalls of such surveys, the authors nevertheless point to some startling findings. They give the case of a 30-year-old transsexual who was treated for two years by a psychiatrist who felt that the patient was nonpsychotic and who concurred in his decision to undergo a conversion operation.

Of those responding to the questionnaires, 55 percent of the psychiatrists, 63 percent of the surgeons, 41 percent of the general practitioners, and 20 percent of the deviant groups would oppose the operation.

The further stipulation that without the operation the patient would probably commit suicide barely affected the percentages; 54 percent of the psychiatrists still opposed such an act. Thus they would rather see the patient dead than grant his request. Interestingly, they responded in this fashion in spite of the fact that 25 percent of the physicians thought such a procedure would improve the patient's mental health and an additional 50 percent felt that it was as likely to help as to harm. Only 25 percent thought it would definitely be harmful, yet a majority of physicians would refuse to grant such a request. I concur with the authors' conclusion that "one could surmise from this disparity that there are many factors other than potential harm to the patient which enter into the reluctance to endorse sex reassignment".

Imagine further the case of an amenorrheic, adult, childless woman. Does it surprise you to learn that 47 percent of the general practitioners, 36 percent of the surgeons, and 25 percent of the psychiatrists held that such a patient should be reassigned if it were found that her chromosomal sex were male? This opinion was expressed in spite of the fact that it had been stipulated that this patient had been assigned to the female sex at birth, reared accordingly, and was psychologically in tune with that sex. Such cases do exist and belong to a syndrome called testicular feminization. Money and the Hampsons have clearly shown that usually such reassignments are disastrous.

My experience leads me to believe that the literature is actually quite constrained in its expression of disdain for these persons. Visits to medical, surgical, or psychiatric wards on which these individuals have been evaluated and treated have demonstrated clearly to me how physicians and nurses alike hold them up to ridicule. Is one paranoid in a delusional sense when he is in fact treated with ridicule, contempt, disdain, and sometimes overt hatred by those from whom he seeks assistance, as well as being harassed by society in general?

Psychotherapy

In the introduction I stated that traditional psychotherapies have been totally unsuccessful in the treatment of adult transsexualism. I have been unable to find a single report that documents the successful psychological treatment of an adult or adolescent transsexual, if "successful treatment" means getting such an individual—male or female—to change his orientation to one consistent with his anatomic sex. Psychotherapy in relation to the identity disturbance can be of tremendous importance if directed toward helping such persons deal with their feelings related to alienation, rejection, and all the other emotional disorders that they, like all other humans, are subject to.

Childhood transsexualism, on the other hand, seems to be responsive to psychotherapy directed at gender reorientation if treatment is begun early. Greenson has reported on the successful outcome of one patient whose treatment began at age five. I also have been treating a child, now seven, who began with another therapist at the age of five and who seems to be making considerable progress in the direction of his anatomic (male) sex. I hope to present this case in detail elsewhere. Attempts at gender reorientation with a 14-year-old male transsexual were disastrous and totally unsuccessful. Other children and adolescents are currently undergoing treatment at the UCLA Gender Identity Research Clinic.

Behavioral Therapy

I have been unable to find a documented case that describes the successful treatment of this condition by behavioral techniques. In fact, it seems that although such modalities have been employed with success in the treatment of fetishism and transvestism, the more transsexual-like the transvestite, i.e., the more he begins to fantasy himself a woman and the less fetishistic he is, the poorer the prognosis for successful response to faradic aversion.

Psychopharmacology

Psychopharmacology is mentioned for the sake of completeness. Drugs employed with the intent of achieving gender reorientation are of no use. Hormonal therapy of use in a therapeutic trial of reversible castration and in conjunction with the conversion operation has been adequately described by Benjamin. The early adolescent on the brink of puberty presents a special problem. Virilization of the male transsexual and feminization of the female transsexual result in compounding their already profound emotional turmoil. There should be careful evaluation of the potential for reorientation, and in those for whom this appears unlikely—this will include the vast majority, if not all, of such patients—institution of the appropriate hormones consistent with the psychological sex is indicated. Marked psychological improvement resulted from the adaptation of this approach in a teenager who deteriorated following an attempt at reorientation.

The Sex-Conversion Operation

If gender reorientation, as has been shown for adolescents and adults, is not possible by any presently available treatment modality, what should be done? The position of Stafford-Clark is representative of those who oppose surgery. He states: "It is my personal belief that there can be no greater tragedy and no greater mistake than to embark upon a series of mutilizations or interferences with the shape of a person's body or the balance of their glands in a misguided attempt to make them into a travesty of something they can never be, however much they desire it". Upon what objective basis are such objections founded?

The studies by Benjamin, Hertz and associates, and Pauly clearly indicate that fears of catastrophic

outcomes of sex-conversion surgery are unwarranted. Operated patients tend to do very well in spite of the fact that a significant percentage of them are probably transvestites, in whom the symptom represents a counterphobic dynamic and whom we would not recommend for such a procedure. Theoretically, I would expect a series containing mixed diagnoses to do less well than one composed entirely of transsexuals.

The experience at the UCLA Gender Identity Research Clinic is even more encouraging. A total of 22 transsexuals have been seen at the clinic; 15 were male transsexuals, four of them children and two adolescents. Six of the nine adult men had undergone the conversion operation, as had two of the seven women. Only one of these patients, a man, had been operated upon at UCLA. This patient had originally been thought to be an intersex, the only type of patient permitted to be operated upon under departmental policy. (Because of this restriction we are not permitting this procedure at UCLA to anyone we know to be a transsexual.)

The result in each instance was excellent. Not one of the eight regretted the surgery, failed to feel emotionally improved, or was unable to make a satisfactory adjustment. Interestingly, male transsexuals postoperatively reported clinical sexual data much like those described by many normal women. They are aroused more slowly and become more discriminate in regard to their partners, often climaxing only with those for whom they have an emotional attachment.

There are no laws to prevent the performance of such procedures, although it is possible that the mayhem statutes, which unquestionably were not intended for such purposes, could be invoked. Some states have been sympathetic to the plight of the transsexuals, and I know of several instances in which alterations of sex status on birth certificates have been granted. Other states, such as New York, have adopted a policy opposing record changes under the misguided effort to protect against fraud.

Conclusion

I have attempted to show that theoretical bias as well as what appear to be purely subjective negative attitudes have created a climate of misunderstanding and confusion that has resulted in promoting and prolonging the suffering of fellow human beings. I have been unable to find evidence in the literature to support the forebodings of Ostow, Gutheil, Lukianowicz, Stafford-Clark, Meerloo, and others against the conversion operation or for the continued application of an insight-oriented approach with the exception of children.

While I wish to emphasize that I am in no way calling for the mass indiscriminate application of sex-conversion surgery, I do feel that the opposition to such procedures is predominantly emotional and that there is an indication for such an approach in those rare individuals who are afflicted with transsexualism. The unfortunate consequence of our unwillingness to be objective in our dealings with these people has been to drive the problem underground, only to have it emerge in some other country, often in the hands of an unscrupulous operator. There, in desperation, transsexuals submit to major surgery with general anesthesia often without the benefit of a physical examination or a blood count.

(The references may be seen in the original article.)

CALCIUM IN THE AORTIC VALVE

ROENTGENOLOGIC AND HEMODYNAMIC CORRELATIONS IN 148 PATIENTS

D. Luke Glancy, MD FACP, Thomas A. Freed, MD, Kevin P. O'Brien, MB MRCP, and Stephen E. Epstein, MD, Bethesda, Maryland. *Ann Intern Med 71(2):245–250, August 1969.*

Summary. The extent of aortic valvular calcification, graded roentgenologically, was correlated with hemodynamic severity as assessed by cardiac catheterization in 148 patients over age 35 who had aortic valvular disease. Each of 55 patients with extensive calcium seen on roentgenogram had severe

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aortic valvular disease: 29 had stenosis without significant regurgitation, 25 had stenosis and regurgitation, and 1 had pure regurgitation. Many of the 54 patients with small amounts of calcium seen on roentgenogram or with calcium seen only at fluoroscopy had severe aortic valvular disease, but in 12 of them it was hemodynamically mild. Of 39 patients in whom calcium could not be demonstrated either fluoroscopically or on roentgenograms, 12 had severe aortic regurgitation, but only 1 had severe aortic stenosis. The extent of aortic valvular calcification in general correlated with the peak systolic transvalvular pressure gradient but did not correlate with the degree of aortic regurgitation, and calcium was usually absent in patients with pure regurgitation regardless of its severity. Roentgenologic assessment of aortic valvular calcification provides useful information for evaluating patients suspected of having aortic valvular disease.

Although calcification of the aortic valve can be demonstrated fluoroscopically in most adults with aortic stenosis, no systematic attempts have been made to determine if the degree of calcification as assessed roentgenologically can be correlated with hemodynamic severity as assessed by cardiac catheterization. The results of such a correlation in 148 patients with aortic valvular disease are described.

Methods

Patients over 35 years old who were found to have mild to severe disease of the aortic valve at cardiac catheterization were selected for study. The resulting group of 148 patients included 104 men ranging in age from 36 to 68 years (average, 50) and 44 women ranging in age from 36 to 67 years (average, 51). Patients under 36 years old were excluded since it is known that in children and young adults severe congenital aortic stenosis often occurs in the absence of demonstrable calcium in the aortic valve.

In each patient the presence or absence of aortic valvular calcium was evaluated by image intensification fluoroscopy and by chest roentgenograms taken in the posteroanterior, lateral, and two oblique views. Calcification of the aortic valve was then graded by one of the authors who was unaware of the catheterization findings. The grading system utilized was as follows:

Grade 0: No calcium was seen either at fluoroscopy or on chest roentgenograms.

Grade I: Calcium was seen at fluoroscopy, but none was seen on roentgenograms.

Grade II: Calcium was seen at fluoroscopy, and one or several small flecks of calcium were seen on roentgenograms (Figure 1).

Grade III: Calcium was seen at fluoroscopy, and extensive calcium was seen on roentgenograms. In some patients with grade III calcification, the calcium appeared on roentgenogram as multiple nodules suggesting a ring whereas in others it was even more extensive and appeared as a definite confluent ring in the region of the aortic valve (Figure 1).

Calcium usually was best detected fluoroscopically in the right anterior oblique projection and radiographically on the lateral film.

During cardiac catheterization simultaneous left ventricular and systemic arterial pressures were recorded in each patient. Cardiac output was de-

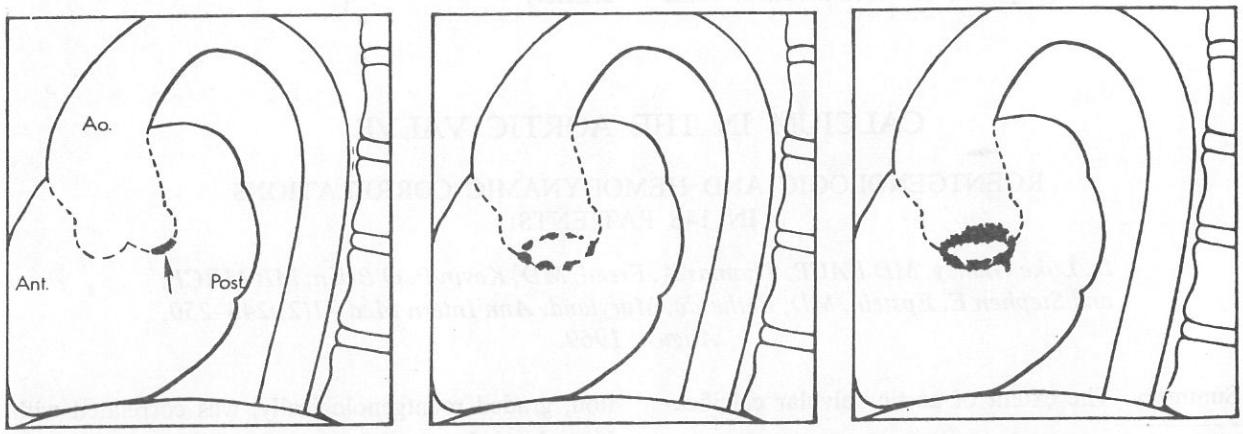


Figure 1. Lateral chest roentgenograms. Diagrams demonstrate various degrees of calcification of the aortic valve.
Left. A single fleck of Calcium (grade II) (arrow). Ao.=aorta; Post.=posterior; Ant.=anterior.
Middle. Multiple nodules of calcium suggesting a ring (grade III).
Right. A confluent ring of calcium (also grade III).

termined from indicator dilution curves or by the Fick method when significant valvular regurgitation was present. In those patients without aortic regurgitation the effective aortic valvular orifice area was calculated by the Gorlin formula. The degree of aortic regurgitation was assessed by cineaortography.

Results

Fifty-nine patients had aortic stenosis without significant regurgitation; 69 had aortic stenosis and regurgitation; and 20 had aortic regurgitation without a systolic pressure gradient between the left ventricle and systemic artery. Fifty-three of the 148 patients had disease of the mitral as well as of the aortic valve. Aortic valvular calcium was demonstrated fluoroscopically in 109 (74%) of the 148 patients. The grade of calcification is compared to the peak systolic transvalvular pressure gradient in Figures 3 and 4 (not shown).

Grade III Aortic Valve Calcification

Of the 55 patients with extensive calcium visible on chest roentgenogram, 29 had aortic stenosis without significant regurgitation. The peak systolic transvalvular pressure gradient in these patients ranged from 62 to 140 mm Hg (average, 96), and the aortic valvular orifice ranged from 0.15 to 0.52 cm^2/m^2 body surface area (average, 0.31). Twenty-five patients had aortic stenosis and regurgitation. Three of them had peak systolic gradients of less than 50 mm Hg, and each of the three had severe aortic regurgitation. The other 22 had gradients of 50 to 130 mm Hg and moderate or severe aortic regurgitation. One patient had no systolic pressure gradient but had severe aortic regurgitation. Thus, each of the 55 patients whose chest roentgenograms showed extensive calcification of the aortic valve had hemodynamically severe aortic valvular disease.

Grade II Aortic Valve Calcification

Of the 31 patients whose chest roentgenograms showed a small amount of calcium in the aortic valve, 14 had aortic stenosis without significant regurgitation. The peak systolic gradient in these patients ranged from 25 to 166 mm Hg (average, 79), and the aortic valvular orifice ranged from 0.19 to 0.97 cm^2/m^2 average, 0.42). Sixteen patients had aortic stenosis and regurgitation. In these subjects the peak systolic gradient ranged from 10 to 94 mm Hg (average, 43), and the degree of aortic regurgitation ranged from mild to severe. One patient had severe aortic regurgitation without stenosis. Thus, among patients with grade II calcification the hemodynamic severity of the aortic valvular disease ranged from mild to severe.

Grade I Aortic Valve Calcification

Of the 23 patients in whom calcium was seen in the aortic valve fluoroscopically but not on chest roentgenogram, 10 had aortic stenosis without significant regurgitation. The peak systolic gradient in these patients ranged from 16 to 98 mm Hg (average, 63), and the aortic valvular orifice from 0.17 to 1.50 cm^2/m^2 (average, 0.46). Ten patients had aortic stenosis and regurgitation. In these subjects the peak systolic gradient ranged from 12 to 130 mm Hg (average, 40), and the degree of aortic regurgitation ranged from mild to severe. Three patients had aortic regurgitation without stenosis. In two of them the regurgitation was severe whereas in one it was moderate. Thus, varying degrees of hemodynamic severity also were found in patients with grade I calcification.

No Demonstrable Calcium in Aortic Valve (Grade 0)

Of the 39 patients in whom no calcium was seen in the aortic valve either fluoroscopically or on chest roentgenogram, 6 had aortic stenosis without significant regurgitation. One of these six patients had a peak systolic gradient of 40 mm Hg and an aortic valvular orifice of 0.41 cm^2/m^2. In each of the other five patients the peak systolic gradient was 30 mm Hg or less, and the aortic valvular orifice was 0.69 cm^2/m^2 or greater. Of the 18 patients with aortic stenosis and regurgitation, the peak systolic gradient ranged from 2 to 44 mm Hg (average, 19), and the degree of aortic regurgitation ranged from mild to severe. Fifteen patients had aortic regurgitation without stenosis. In 12 of them the regurgitation was severe whereas in three it was moderate. Thus, although severe aortic regurgitation was common in patients without demonstrable calcium in the aortic valve, severe aortic stenosis was found in only 1 patient, and none of the 39 patients had a transvalvular gradient greater than 44 mm Hg.

Sex and Aortic Valve Calcification

The prevalence of calcium in the aortic valve in the entire series was higher in men than in women (82% versus 55%, $P < 0.01$). Of the patients with peak systolic gradients above 60 mm Hg, however, sex could not be shown to influence either the presence or the degree of calcification.

Age and Aortic Valve Calcification

Calcification of the aortic valve was found more frequently in women over the age of 50 years than in women 36 to 50 years old (71% versus 35%, P=0.05), but the average systolic gradient was also higher in the older women (61 versus 32 mm Hg, mean difference ± SEM=29 ± 12 mm Hg, $P < 0.05$); when women with similar gradients were compared age could not be shown to influence either the presence or severity of aortic valvular calcification. Thus, calcification of the aortic valve correlated with the severity of aortic stenosis rather than with age itself.

The prevalence of calcium in the aortic valve was identical (82%) in men over the age of 50 years and in men 36 to 50 years old, but more of the older men had grade III calcification (58% versus 28%, $P < 0.01$). The average peak systolic gradient was also higher in the older men (61 versus 51 mm Hg), but not significantly so.

Coexistent Mitral Disease and Aortic Valve Calcification

The prevalence of calcium in the aortic valve was higher in patients without coexistent disease of the mitral valve than in patients with mitral valvular disease (86% versus 51%, $P < 0.01$), and grade III calcification was found more frequently in patients without mitral disease (52 versus 11%, $P < 0.01$). The average peak systolic pressure gradient between left ventricle and systemic artery was also higher in patients without mitral disease (65 versus 32 mm Hg, mean difference = 33 ± 6 mm Hg, $P < 0.01$). Coexistent mitral valvular disease was found more frequently among women than men (61 versus 25%, $P < 0.01$), and patients with coexistent mitral disease were younger than those with isolated aortic valvular disease (47 versus 52 years, $P < 0.05$).

Discussion

The most important finding of this study was that extensive calcification of the aortic valve seen on the chest roentgenogram (grade III) always signified severe aortic valvular diesase. Usually the hemodynamic abnormality was severe stenosis with or without significant regurgitation. Occasionally regurgitation was dominant, and one of the patients with grade III calcium had severe aortic regurgitation without stenosis. In contrast, although many of the patients with grade I or II calcification had hemodynamically severe aortic valvular disease, 7 of the 23 patients with grade 1 and 5 of the 31 with grade II calcification had peak systolic transvalvular gradients of less than 30 mm Hg and absent-to-moderate aortic regurgitation. Thus, although extensive calcification of the aortic valve on roentgenogram was always associated with hemodynamically severe disease, a considerable number of patients with lesser degrees of calcification had only mild disease.

Conversely, the *absence* of calcium at fluoroscopy in a patient over 35 years old suggests, with occasional exceptions, that left ventricular outflow obstruction is absent, mild, or not at valve level. It should be emphasized that this applies only to patients over age 35 since in children and young adults severe congenital aortic valvular stenosis often occurs in the absence of calcium.

In contrast to the finding of aortic valvular calcification in 90% of patients with aortic stenosis and in 74% of those with stenosis and regurgitation, calcification of the aortic valve was unusual in patients with pure aortic regurgitation of all degrees of severity. Calcium was demonstrated in only 5 of the 20 patients with pure aortic regurgitation, and in 3 of the 5 it was seen only fluoroscopically.

Calcification of the aortic valve was found more commonly in older patients, in men, and in patients without coexistent mitral valvular disease. These findings can be explained in part by the pathogenesis of aortic stenosis in the adult. Isolated aortic stenosis is rarely rheumatic in origin. Although the aortic valve may have been malformed from birth (bicuspid, for example), the stenosis is most often acquired and results from immobilization of the valvular leaflets by calcium deposits of unknown cause. Commissural fusion is usually of lesser importance, and in general the severity of the stenosis parallels the degree of aortic valvular calcification. Symptoms usually do not develop until both the stenosis and the calcification are relatively severe, which is most often after the age of 40 years, thereby explaining the higher prevalence of severe aortic valvular calcification in older patients with severe isolated aortic stenosis. This also explains the greater prevalence of calcification in men since they have isolated aortic stenosis much more commonly than women. In contrast, aortic stenosis associated with disease of the mitral valve is usually rheumatic. Commissural fusion is frequently the major cause of the stenosis, and, although heavy calcification of the aortic valve may occur, it is not a necessary component of even severe stenosis. In addition, mitral disease often produces symptoms at a relatively young age when aortic valvular function is only mildly impaired and

before heavy calcification appears. These considerations would explain the higher prevalence of absent or slight aortic valvular calcification in patients who have coexistent mitral disease.

Acknowledgment

The authors gratefully acknowledge the invaluable assistance of Mr. Morton S. Raff, Mathematical Statistician, Biometrics Research Branch, National Heart Institute, Bethesda, Md., in the statistical analysis of the data.

(Figures 2, 3, 4, and the references may be seen in the original article.)

The Gastroenterologist Corner

DYSPHAGIA

(FROM THE GREEK: PHAGIA, TO EAT; DYS, WITH DIFFICULTY)

CDR Donald O. Castell, MC, USN, Director of Gastrointestinal Research, Naval Hospital Philadelphia, Pennsylvania.

Disorders of esophageal function constitute one of the most poorly understood areas of Gastroenterology. The average clinician often finds himself at a considerable disadvantage when evaluating a patient with esophageal disease. This is quite regrettable since a good understanding of the symptoms of esophageal dysfunction coupled with proper application of a few selected procedures should lead to a clear diagnosis in greater than 90% of cases.

The primary function of the esophagus would appear to be one of transport of ingested material from the mouth to the stomach through a coordinated neuromuscular response. The cardinal symptom of esophageal dysfunction is dysphagia, as manifested by the sensation that ingested material sticks somewhere in the chest for variable time intervals after swallowing. Although some patients characterize this sensation as pain, such is not usually the case, and dysphagia should not be used interchangeably with pain on swallowing (odynophagia). The sensation of food sticking may be felt by the patient anywhere from the suprasternal notch to the xiphoid process. In the former situation the symptom usually has little localizing value, since even with lesions in the distal esophagus the patient may note dysphagia high up in the chest. However, dysphagia described as being felt at a lower level is more helpful since it is more likely to identify the location of the lesion.

It is important that one differentiate dysphagia from so-called "globus hystericus." This fairly common sensation of a "lump in the throat" does not impair transport of food, and is generally considered to be psychogenic in origin. True dysphagia virtually *always* indicates the presence of organic disease.

Classification of Dysphagia

Dysphagia can be broadly categorized into oropharyngeal (or preesophageal) and esophageal in type. The former is that swallowing disorder noted with local oropharyngeal disease such as acute pharyngitis or thyroiditis, or in a variety of conditions with involvement of striated (voluntary) muscle function, including central nervous system lesions, polymyositis, dermatomyositis, myasthenia gravis, etc.[1] For the purpose of this discussion it is sufficient to note that dysphagia in such cases is usually just another manifestation of an obvious disease process, and does not pose a diagnostic problem. Briefly, this form of dysphagia represents primarily a problem of initiating the swallow, and is often worse with liquids than with solids. In addition swallowing may be attended by coughing due to aspiration of ingested material.

Importance of History

Esophageal dysphagia is that form of swallowing dysfunction due to a lesion in the smooth muscle (involuntary) portion of the esophagus. Clinicians often too glibly emphasize the importance of a carefully-taken history in arriving at a diagnosis, but when dealing with a patient having dysphagia a good understanding of symptomatology should lead

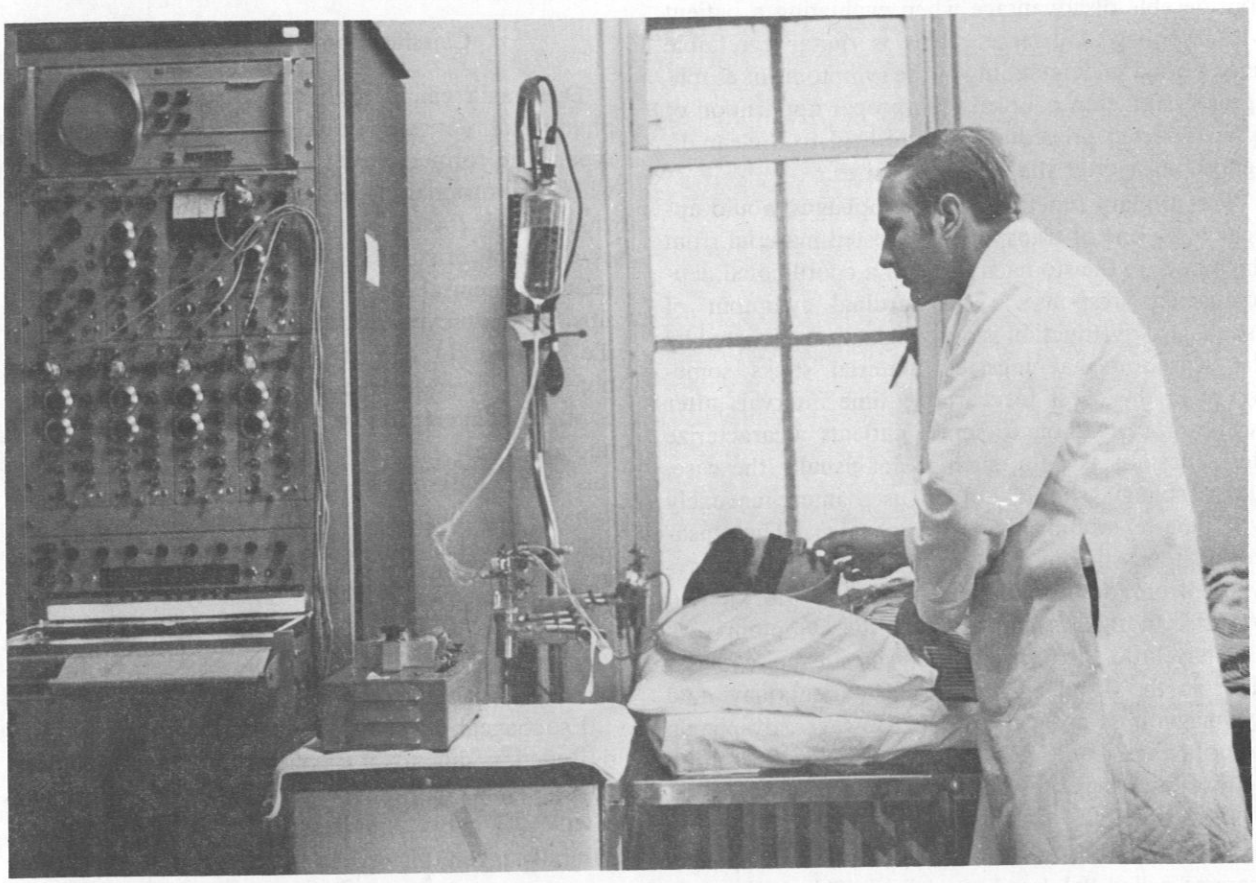
to a strong suspicion of the diagnosis in probably 85% of cases. The important lesions causing esophageal type of dysphagia can best be classified by separation into those causing mechanical obstruction and those involving motor dysfunction. One should recognize that the former are characterized by dysphagia for solid foods *initially,* with dysphagia for liquids occurring only after a preceding solid bolus has become lodged in the esophagus or after the lesion has progressed to produce almost total obstruction of the lumen. In those disorders of esophageal motor function however, the dysphagia may be equally apparent after solids or liquids, and in fact may even be more prevalent with liquids, particularly cold liquids or ice cream. At this point, I should emphasize that recent weight loss is not necessarily of differential value since most patients with persistent dysphagia will lose weight. Other aspects of the history will be discussed with the individual lesions.

As stated above, the history alone should suggest a diagnosis in the majority of cases. The other diagnostic tools available include barium swallow, esophagoscopy, esophageal cytology, and esophageal manometry.

Mechanical Obstruction

There are three important intrinsic lesions causing esophageal obstruction; carcinoma, benign stricture, and the lower esophageal ring.

Lower esophageal ring: In 1953 Schatzki described the occurrence of dysphagia in patients who were otherwise well, and in whom a symmetrical, narrow filling defect could be identified at the lower end of the esophagus on barium swallow.[2] This lesion, now often called a "Schatzki ring" apparently represents an invagination of the lower esophageal mucosa located 3-5 cm above the cardioesophageal junction on X-ray. If carefully sought it can be found in up to 18% of people, and thus represents one of the commonest causes of dysphagia in persons under 45. The history is quite typical, in that dysphagia occurs only after solids, and in particular after a larger bolus such as a large piece of meat or bread.



The author conducts esophageal motility studies in the laboratory.

It is typically *intermittent* and non-progressive, with the patient being asymptomatic between attacks. These patients are often told that their symptoms are functional, particularly since the lesion is often missed on routine barium studies unless carefully sought. This benign condition rarely requires therapy other than reassurance and avoidance of swallowing a large bolus of food.

Benign stricture: Stricture of the esophagus is believed to be a result of chronic peptic esophagitis due to repeated reflux of gastric acid, although the sequence of this proposed pathogenesis has not been confirmed experimentally. Nevertheless, these patients usually give a history of troublesome heartburn for years prior to the development of stricture. As with the other obstructive disorders, the dysphagia occurs after solid foods. The X-ray appearance is that of a narrowing of the esophageal lumen of variable length, usually in the lower third of the organ, although benign strictures may develop much higher. Because it is often difficult to exclude a carcinoma, evaluation of these patients should include esophagoscopy and cytology. Dilatation with esophageal bougies is usually effective.

Carcinoma: Typically these patients will be over age 45, and present with a history of *progressive* dysphagia of relatively short duration, initially occurring only after solids and without the antecedent chronic heartburn noted by the patient with a stricture. The increased incidence of this lesion in smokers and alcoholics has been reported. X-ray examination usually shows an irregular narrowing of the esophageal lumen. The diagnosis will be established by the combined use of esophagoscopy with biopsy and cytology. The value of cytology in the diagnosis of esophageal cancer has been demonstrated, and our experience at USNH Philadelphia would confirm this observation.[3]

In addition to intrinsic esophageal lesions, dysphagia can result from extrinsic compression of the esophagus by lesions such as mediastinal tumors, aneurysms, or an aberrant right subclavian artery ("dysphagia lusoria").[4]

Motor Disorders

As with the obstructing lesions, esophageal motor disorders include three basic abnormalities: achalasia, diffuse spasm, and scleroderma. The hallmark of these lesions is dysphagia for both solids and liquids. Esophageal motility studies are paramount in establishing the diagnosis in these lesions.

Achalasia: A better term for this disorder is probably "Aperistalsis," since absence of peristalsis is the basic abnormality in these patients. This is apparently caused by the decreased or absent myenteric ganglion cells found in autopsy studies of achalasia patients.[5] The history is often quite typical, characterized by dysphagia for solids or liquids, often of many months to years duration, with a relative absence of heartburn. Nocturnal coughing or vomiting of retained material from the esophagus is not uncommon. X-ray examination usually reveals esophageal dilatation of variable degree (often extreme), with a smooth tapering at the distal end, and slow passage of barium into the stomach. It is often difficult for the radiologist to be positive about absence of peristalsis, since he may confuse esophageal "activity" with a true progressive peristaltic wave. Intraesophageal pressure studies (esophageal motility) can provide positive evidence of total absence of peristalsis, thereby indicating a definite diagnosis. In addition, manometric studies usually reveal an exaggerated zone of high pressure (lower esophageal sphincter) at the distal end of the esophagus. Treatment involves either forceful dilatation of the lower esophageal sphincter with a pneumatic dilator or a surgical procedure involving myotomy of the distal esophageal smooth muscle. At the Naval Hospital, Philadelphia the former therapy is much preferred.

Diffuse esophageal spasm: This lesion enjoys a variety of synonyms, including esophageal curling, tertiary contractions, corkscrew esophagus, and others. The descriptive terms refer to the tortuosity and localized narrowing of the esophagus seen on barium swallow. This appearance is not unusual in elderly persons, but is often asymptomatic. When symptomatic, patients with diffuse spasm have dysphagia with both solids and liquids, and may have greatest difficulty with cold liquids. There may be associated chest pain, which may mimic angina, even to the point of relief from nitroglycerine (smooth muscle relaxation).

Therapy is often difficult, but includes either forceful dilatation as for achalasia, anticholinergic drugs or nitrites if effective.

Scleroderma: In recent years there has been increasing awareness of smooth muscle abnormalities in patients with scleroderma. Dysphagia is a frequent occurrence and may even precede the skin changes, although it seems to be well correlated with the presence of Raynaud's phenomenon. Typically dysphagia occurs with solids and liquids, and heartburn is a common complaint. X-ray and motility studies show the effects of the basic pathologic abnormality, smooth muscle atrophy of the esopha-

gus.[7] On X-ray examination the esophagus is dilated, with poor activity and a widely patent lower sphincter. Free reflux is common. Manometry again is diagnostic, demonstrating the combination of weak to absent peristalsis in the smooth muscle portion of the esophagus and a weak to absent sphincter at the esophago-gastric junction. Therapy, unfortunately, is symptomatic and non-specific.

Others: Dysphagia has been described in patients with Sjögren's syndrome.[8] It is usually attributed to a lack of adequate lubrication for normal swallowing. Transient dysphagia of 1-2 months duration has been described in a small percentage (10%) of patients following vagotomy.[9] This phenomenon appears to represent a motor dysfunction of the esophagus, and rarely requires therapy.

In conclusion, let me re-emphasize the importance of a thorough understanding of dysphagia with a quotation from Dr. Schatzki. "I believe dysphagia is one of the most enjoyable clinical symptoms for the examiner because when it is present you have the greatest chance to find the cause of the patient's complaint. I do not know of any other digestive symptom where one is more likely to find the cause of the trouble and you cannot afford to let the patient with dysphagia leave you without finding out its cause."[10]

References

1. Kramer, P., M. Atkinson, S. Wyman, and F. J. Inglefinger, The dynamics of swallowing. *J Clin Invest* 36:598, 1957.
2. Schatzki, R., The lower esophageal ring. *Amer J Roent* 90:805, 1953.
3. MacDonald, W. C., L. L. Brandborg, L. Taniguchi, and C. E. Rubin, Esophageal exfoliative cytology. *Ann Intern Med* 59:332, 1963.
4. Palmer, E. D., Dysphagia lusoria: Clinical aspects in the adult. *Ann Intern Med* 42:1173, 1955.
5. Rake, G. W. On the pathology of achalasia of the cardia. *Guy's Hosp Rep* 77:144, 1927.
6. Creamer, B., F. E. Conaghue, and C. F. Coade, Pattern of esophageal motility in diffuse spasm. *Gastro* 34:782, 1958.
7. Treacy, W. L., A. H. Baggenstoss, C. H. Slocumb, and C. F. Code, Scleroderma of the esophagus. *Ann Intern Med* 59:351, 1963.
8. Wood, I. J., Some medical aspects of dysphagia. *Proc Coll Radiol Aust* 2:75, 1958.
9. Pierandozzi J. S. and J. H. Ritter. Transient achalasia. A complication of vagotomy. *Amer J Surg* 111:356, 1966.
10. Schatzki, R. Panel discussion on diseases of the esophagus. *Amer J Gastro* 31:117, 1959.

DENTAL SECTION

PERSONNEL AND PROFESSIONAL NOTES

CDR KELLY SPEAKS AT ASSOCIATION OF MILITARY SURGEONS MEETING

CDR James F. Kelly, DC, USN, Naval Hospital, Chelsea, Massachusetts, presented a paper at the 76th Annual Meeting of the Association of Military Surgeons of the United States on 17 November at the Sheraton-Park Hotel, Washington, D.C. The title of the presentation was "Rehabilitation of Maxillofacial Battle Casualties—1969." CDR Kelly reviewed the status of the maxillofacial bone grafting technic developed at the Dental Department of the Naval Medical Research Institute, Bethesda, Maryland, in which autogenous bone marrow is used. General case reports of Vietnam casualties in which the technic had been applied were discussed. Plans for the long term study of cases in which this bone grafting technic has been applied were outlined by CDR Kelly.

NAVAL BASE YOKOSUKA AND NAVAL AIR STATION MIRAMAR FLUORIDATE WATER

A traditional ribbon-cutting ceremony was recently held to initiate fluoridation of the base water supply at the Naval Base, Yokosuka, Japan. The Public Works Center installed the equipment as a Bureau of Medicine and Surgery-approved dental health measure.

Water fluoridation has also been implemented at the Naval Air Station, Miramar, California. CAPT Kenneth L. Longeway, DC, USN, is the Commanding Officer of the U.S. Naval Dental Clinic, Yokosuka and CAPT Frank B. Rhobotham, DC, USN, is the Dental Officer at Naval Air Station, Miramar.

PERSONNEL MANAGEMENT IMPROVEMENT

In a recent memorandum the Chief of Naval Personnel discussed the subject of attitude toward shipmates with emphasis on the importance of attitude and expertise of those key Navymen, which includes dental personnel, who man our "contact points." "Any deficiencies in the attitude or expertise of these personnel have an immediate, significant, and adverse impact on the morale, motivation, and retention of our Navymen, states the Chief of Naval Personnel.

We share the responsibility for making these "contact points" as effective and customer-oriented as possible, insuring that our men receive straight and accurate information in language they understand and that they receive assistance, and service, from knowledgeable, expert personnel in a courteous and helpful manner.

BOARD CERTIFICATION ELIGIBILITY REQUIREMENTS (1969)

The following table summarizes the requirements for eligibility for certification in the various dental specialties.

	Public Health	Endo-dontics	Oral Pathology	Oral Surgery	Ortho-dontics	Perio-dontics	Prostho-dontics
ADA or NDA Membership	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Years of Advanced Education	2	2	2	3	2	2	2
Acceptable Programs							
* Internship	No	Yes	No	Yes	Yes	No	Yes
Postgraduate	No	Yes	Yes	Yes	Yes	Yes	Yes
Residency	Yes	Yes	No	Yes	Yes	Yes	Yes
Specialty Experience including Advanced Education (years)	6**	5	5	5	5	5	5
Exclusive practice of Specialty	Yes	No	No	Yes	Yes	No	No
Required % of Limitation	100%	50%	50%	100%	100%	NS***	50%

* Non-rotating.
** A total of 8 calendar years of experience and/or education shall have elapsed subsequent to graduation from dental school before a candidate is eligible for examination.
*** Percentage of time not specified.

PROFESSIONAL RELATIONS PROGRAM

PRESIDENT OF AMERICAN COLLEGE OF DENTISTS SPEAKS AT NAVAL DENTAL SCHOOL

Doctor Frank P. Bowyer, new President of the American College of Dentists, recently spoke at the Naval Dental School to staff, graduate dental officers and visiting civilian dentists on "The Future of Dentistry."

The keynote of his address was "social concern." If the dental profession is to maintain a favorable image in today's rapidly changing society, the dentist must become an informed citizen, active in community affairs. To achieve honest and progressive political leadership, he must work with fellow citizens who feel the same—not just with fellow dentists.

"The practice of dentistry is a privilege, and for every privilege we have a corresponding responsibility," said Doctor Bowyer. "You are not privileged to practice dentistry merely by education and licensing by state boards; you must have a sincere desire to serve your fellowman."

The greatest challenge of dentistry today, he said, is to provide services to all segments of the population. Every individual expects good health care, and as an individual, the dentist must provide more care to more people.

To accomplish quality dental care, Doctor Bowyer urged the expansion of dental offices by the use of more treatment rooms, modernized equipment, and trained auxiliary personnel.

VIRGINIA TIDEWATER DENTAL ASSOCIATION AND NAVAL DENTAL OFFICERS HOLD JOINT MEETING

A joint meeting of the Virginia Tidewater Dental Association and Naval Dental Officers of the Tidewater area was held at Norfolk, Virginia. The one-day meeting consisted of table clinics and oral presentations followed by dinner and entertainment at the Officer's Club.

Approximately 265 military and civilian dentists and their wives were in attendance. Doctor Leonard Oden is President of the Virginia Tidewater Dental Association and RADM Maurice Simpson, DC, USN is Director, Dental Activities, FIFTH Naval District.

NAVAL DENTAL CLINIC, NEWPORT HOSTS JOINT MEETINGS

The officers of the Naval Dental Clinic, Newport, Rhode Island, recently hosted a meeting of the New England Dental Study Club. Fifty-five dentists attended the dinner meeting at which Doctor Jose E. Medina, Director of the Study Club and Dean of the College of Dentistry, University of Florida, spoke on "New Trends in Dental Education." Doctor Medina was also the director of the direct gold operating session held the following day.

Doctor Lloyd Baum, Chairman of Restorative Dentistry, School of Dentistry, Loma Linda University, Loma Linda, California, was also a guest of the Naval Dental Clinic, Newport. Doctor Baum spoke to military and civilian dentists of Rhode Island on operative dentistry and fixed prostheses procedures.

CAPT T. R. Hunley, DC, USN, is Commanding Officer of the Naval Dental Clinic, Newport, Rhode Island.

ARTICLES AND ABSTRACTS

FIFTY YEARS OF DENTAL RESEARCH AT THE NBS

Dent Abs 14(12): 706, Dec 1969.

Fifty Years of Dental Research at the NBS. . . . The National Bureau of Standards in its 50 years of dental research has helped transform the practice of dentistry in several ways. The initial impetus for the Bureau's dental research program came in 1919 when the Army asked NBS to test dental amalgam alloys that were proving unsatisfactory. From this request came the realization that scientific data were lacking not only for specific amalgams but for all dental materials. NBS scientists found that delayed expansion of amalgam was caused by gas evolved and entrapped in the amalgam, and that such expansion could be eliminated by prevention of moisture contamination of the amalgam during preparation of a tooth restoration.

Since that time, dental research at NBS has progressed and broadened, ranging from studies of restorative materials and instrumentation to studies of basic tooth structure. This research program is carried on by NBS staff personnel, research associates, members of the armed services Dental Corps, and guest workers. "The sponsorship of a substantial research associate effort in dental research by the American Dental Association for about 40 years has encouraged unusually close rapport among this physical science laboratory, dental manufacturers, and practicing dentists," the Bureau said in a recent news release. "In addition to support by the ADA, the program has been cooperatively funded by the National Institute for Dental Research, the Dental Research Division of the US Army Research and Development Command, the Dental Sciences Division of the School of Aerospace Medicine (US Air Force), and the Veterans Administration."

Pioneer work on gold alloys at NBS during 1922 and 1932 placed the casting of dental restorations on a scientific basis.

The stable and lifelike dentures available today owe much to the dental research staff's studies on resins begun in the 1930's. The first advance in high-speed, rotating cutting instruments that led to a breakthrough in operative dentistry resulted from this group's research, the Bureau asserts. Today's air turbines, with speeds of 200,000 to 400,000 rpm, were prompted by the NBS development of the contra-angle turbine handpiece. A panoramic X-ray machine developed for the US Air Force was designed for rapid surveying and general diagnosis of the oral condition of military inductees. The instrument takes a picture of the complete dental arch in a few seconds on a film outside the mouth; it currently is in extensive use in military clinics and induction centers and

its use in civilian hospitals and medical offices is increasing.

More recently, NBS and Army researchers developed an improved dental splinting material for treating jaw fractures; the doughlike material, which hardens in four to seven minutes, replaces the more commonly used arch bars.

Currently, dental researchers at the Bureau are striving to produce a dental restorative material that will adhere permanently to hard tooth tissue. Other current research projects include work on composite materials for temporary restorations, the possibility of grafting polymers to tooth dentin, the potential use of dental liners (adhesives that bond to the tooth structure and to restorative material), the chemical treatment of teeth to increase the adhesiveness of a resin filling, and basic research in crystal structure analyses of enamel and dentin.

RESIDUAL ETHYLENE OXIDE IN PROSTHETIC IMPLANTS AND ENDODONTIC GUTTA-PERCHA FILLING MATERIAL

LCDR A. R. Hube, DC, USN.

Maxillofacial prosthetic implants and endodontic filling materials, when sterilized with ethylene oxide, have been found to retain residual amounts of the gas. Ethylene oxide is extremely lethal to all tissues with which it comes in contact and thus must be totally removed from implants prior to their use. The purpose of this study was to determine the quantity and duration of retention of ethylene oxide in prosthetic materials and endodontic gutta-percha points. The following materials were tested: Optical grade methyl methacrylate, plastic and porcelain denture teeth, Silastic No. 372 and No. 382, denture base methyl methacrylate, and gutta-percha endodontic points. All test materials were fabricated by manufacturers' instructions and were packaged in Bard "Steril-Peel" bags. They were sterilized by a model 100 "Steri-Vac" 3M Corporation ethylene oxide sterilizer in 100 percent ethylene oxide gas for 3 hours at 85° F. Test specimens were aerated for periods of time ranging from 1 hour to 96 hours, and were then placed for 3 days in airtight vials containing triple distilled water. An F & M gas-liquid chromatograph was used to measure the amount of ethylene oxide in the solutions. Optical grade methyl methacrylate and plastic and porcelain denture teeth retained no ethylene oxide. Silastic No. 372 retained 8.50 mg of ethylene oxide per gram of Silastic, which was released in 24 hours; Silastic No. 382 retained 6.9 mg of ethylene oxide per gram, released in 6 hours; denture base methyl methacrylate retained 2.37 mg of ethylene oxide per gram, released in 48 hours; gutta-percha points retained 7.2 mg of ethylene oxide per gram, released in 4 days. It was concluded that materials vary in their retention of ethylene oxide but that plastics should be aerated for approximately 2 days, and gutta-percha for 4 days, prior to use.

(Abstract by Research Work Unit: MR005.19-6052 by LCDR A. R. Hube, DC, USN.)

PLAQUE REMOVAL AND THE USE OF AN ANTIBACTERIAL MOUTHWASH

LCDR P. T. Kennedy, DC, USN, and LCDR T. F. Kravets, DC, USN.

Dental plaque and the bacterial colonies found therein have been indicated as contributors to caries as well as periodontal disease. This study was conducted to determine the effectiveness of a commercially prepared antibacterial mouthwash (Listerine) in the control of plaque formation. Twenty young individuals were used in the study. After a thorough scaling and prophylaxis to produce a zero plaque condition in the mouth, the subjects practiced their usual home oral physiotherapy. After 7 days the teeth were stained and the plaque present on selected surfaces (Ramfjord teeth) was removed by periodontal scalers and curets. The samples were air dried overnight and weighed to the nearest 0.1 mg. The tooth surfaces were again reduced to a zero plaque condition, and those subjects who had formed 0.6 mg or more of plaque were then given either the mouthwash or 0.9 percent saline solution. They rinsed their mouths for approximately 30 seconds three times a day, and after 7 days the plague was again removed and weighed. The results on 15 plaque-forming individuals showed an initial recovery of 1.0 mg of plaque in both the control and experimental groups. After using the rinses, the control group exhibited a decrease of 0.1 ± 0.1 mg of plaque compared to 0.5 ± 0.1 mg for the experimental group. The difference was significant ($P < .01$). It was

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concluded that further investigation into the efficacy of an antibacterial mouthwash in the reduction of plaque is indicated.

(Abstract by Research Work Unit: MR005.19-6052 by LCDR P. T. Kennedy, DC, USN, and LCDR T. F. Kravets, DC, USN.)

SUBMANDIBULAR SWELLING OF UNUSUAL ETIOLOGY

REPORT OF A CASE

CDR W. R. Hiatt, DC, USN, Department of Dentistry, U.S. Naval Hospital, Guam, Mariana Islands.* *Reprinted with permission from Oral Surg Oral Med Oral Path 28:610–612, 1969; copyrighted by The C. V. Mosby Co., St. Louis, Mo.*

Masses in the neck place the practitioner on the alert for infectious or neoplastic processes of either local or metastatic origin. However, this practitioner was not quite prepared for the pathologist's report of adult female *Ascaris lumbricoides* in a submental mass.

Case Report

The patient, a 5-year-old Caucasian boy, had an asymptomatic swelling in the submental area, which had been noticed by his parents. The child was seen by the Pediatric Service, where the 3 by 3 cm lesion was noted to be in the submental area and was described as nontender and fixed. Antibiotics were prescribed for a 10-day period. Re-evaluation at the end of that time disclosed that the mass now measured 4.5 by 4.5 cm; no changes were noted other than the clinical impression of an increase in size. A history of tenderness, pain, chills, or fever was denied.

The patient was referred to the Oral Surgical Service for evaluation. Examination revealed a firm, rubbery mass, approximately 4 by 4 cm in size, in the midline of the anterior neck. The lesion did not transilluminate, was nontender, and was movable during deglutition. No clinical evidence other than the mass was noted. Diagnoses entertained were, in order, epidermoid inclusion cyst, thyroglossal duct cyst, gram-negative "cold" abscess, and neoplasm. Admission to the hospital for subsequent aspiration and/or removal of the mass was advised. A dental roentgenographic survey did not reveal a pathologic condition. No clinical caries was noted. A general surgical consultation resulted in concurrence with the differential diagnosis.

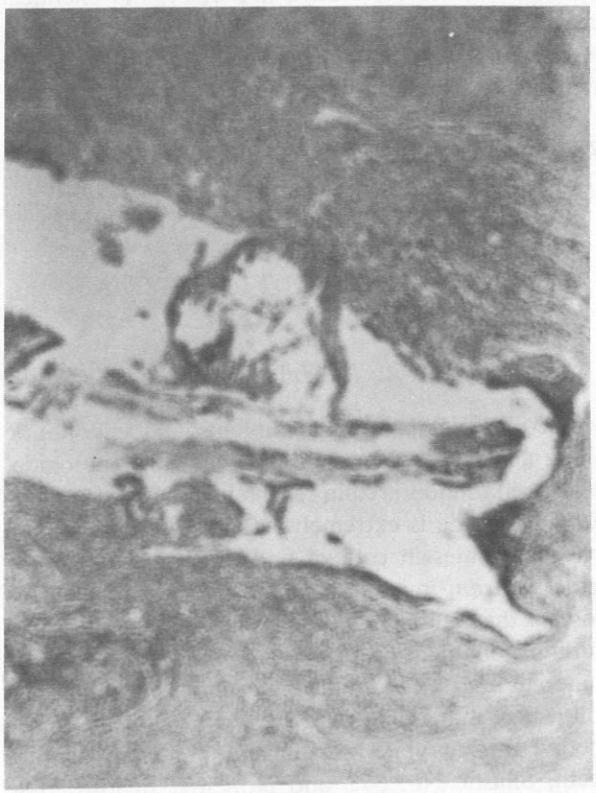

Fig. 1. Low-power microscopic findings from submental mass.

The child was admitted to the hospital with the diagnosis of submandibular mass, etiology undetermined. The results of laboratory studies, physical examination, and a chest roentgenogram were within normal limits.

Operation

Following induction of oral endotracheal general anesthesia, a 4 cm skin-line submental incision was made. The platysma was approached and opened,

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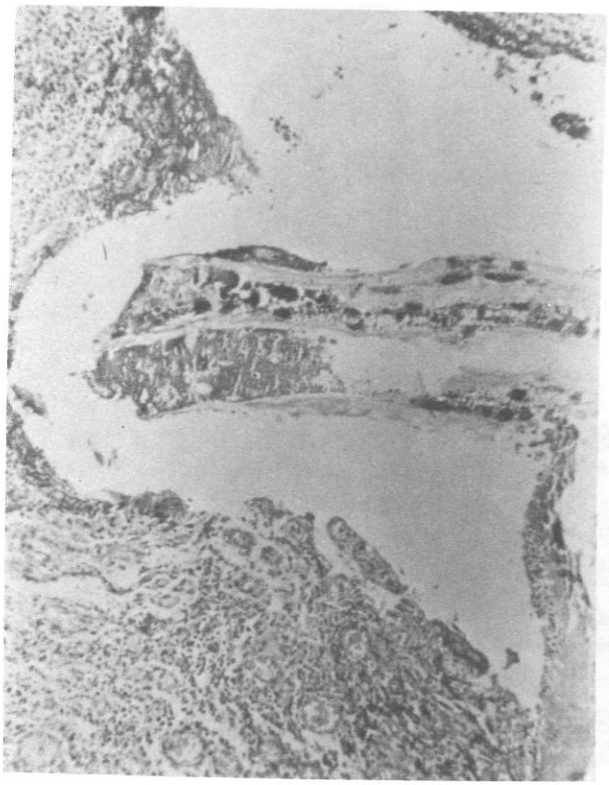


Fig. 2. High-power microscopic findings from submental mass.

and the underlying mylohyoid muscle was identified. Upon retraction of the muscle, a mass 1.5 by 1.5 cm in size with marked induration was noted. There were soft lymph nodes lying on either side of it. A well-formed fistulous tract extended from the underlying surface of the mass in the midline superiorly to the level of the geniohyoid muscle. At the level of the geniohyoid muscle the tract became densely adherent. The mass and adjacent lymph nodes were sharply excised. The tissues were closed in layers, with a Penrose drain in place. The specimen was submitted for a bacteriologic and fungal assay as well as histologic study. The child tolerated the procedure well and was discharged on the third postoperative day to return for outpatient services.

No growth was noted on any culture media. Microscopic examination revealed sections of lymph node and cartilaginous fibrous tissue. The lymph nodes contained slightly enlarged germinal centers. The subcapsular sinus was packed with mature lymphocytes, histiocytes, and occasional eosinophils. The fibrous tissue was edematous, containing a dead and partly necrotic female *Ascaris lumbricoides* adult, partly invaded by polymorphonuclear neutrophils, eosinophils, and fibroblasts. No epithelial elements were noted. The diagnosis was (1) reactive hyperplasia of lymph nodes, submental region, and (2) ascariasis with acute inflammation, submental region (Fig. 1).

The child was referred to the Pediatric Service for treatment of possible ascariasis. Stool specimens did not reveal ova or adults, and the child was treated empirically with piperazine salts.

A persistent thyroglossal duct was considered to be the path of entry of the parasite. Since the worm was also adult, it probably entered the patent duct when regurgitated, probably in vomitus. The other possibility is that a larva could have entered the patent duct at the time the parasite emerged from the lungs and spilled over from the trachea into the esophagus. The child suffered no ill effects from the operation, and there has been no recurrence during a 13-month follow-up.

Note: The author wishes to acknowledge special assistance of CDR D. M. Wilcutts, MC, USN.

NURSE CORPS SECTION

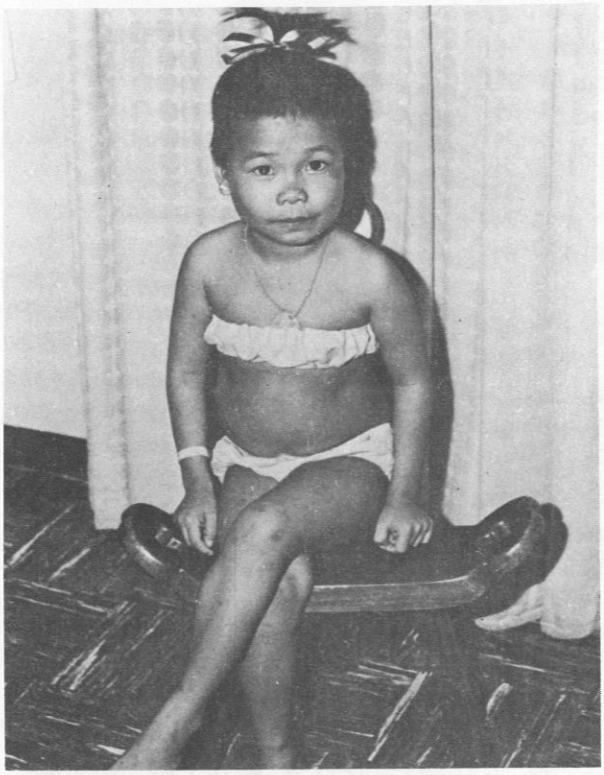
The following Progress Notes depict the course of the International Ward aboard the USS Repose AH–16. The prognosis is excellent. The astute author is LT Kathryn E. Campen, NC, USN. The pictures are delightful.

AN INTERNATIONAL EVENING

The annual USS Repose Fantail Follies Variety program, held in June, 1969, presented by the various hospital departments for the enjoyment of patients, staff, and crew, produced three International Ward children who sang not only in Vietnamese, but English as well.

Tran Ba, an eight-year-old boy, who has become a friend to all and somewhat of a ships' legend fol-

(L to R) Master of Ceremonies, WO Mike Scandurra, and Vietnamese patients, Ton, Thuong & Ba (Ba singing Do-Re-Mi in English).



Fantail Follies, June, 1969—Kinh, the USS Repose's Pin-Up Girl.

lowing a lengthy hospital stay of 10½ months, delighted the audience with our own English version of Do-Re-Mi. Ba received a standing ovation, the only performer so honored during the entire evening.

Nguyen Thi Thuong, a thirteen-year-old girl with gunshot wounds to her face, and Dinh Thi Ton, a ten-year-old with congenital heart disease, combined their pleasant young voices with Ba's to make a trio, singing traditional and modern Vietnamese songs.

Nguyen Thi Kinh, another child of eight years, with osteomyelitis of the mandible, surprised and delighted the audience by appearing in a handmade bikini as the USS Repose's Pin-Up Girl. Her broad, shy smile, dangling earrings, and pony tail, added much to the enjoyment of the evening.

Participation in the planned and unplanned activities and events aboard ship by Vietnamese women and children patients has immeasurably added to the overall acceptance and understanding between two such different cultures. Each group seems to respond spontaneously and completely regardless of the language-communication barrier.

JUNK SCALPINGS

On August 20, 1969, Nguyen Thi Say (New-yen Tee Say), a Vietnamese mother of eleven, was admitted to the International Ward of the USS Repose, with a diagnosis of denuding scalp, resulting from an accident aboard a small fishing junk. Some ten days later, a similar accident occurred with a fish-scaler, resulting in the admission of Ho Thi Chau (Ho Tee Chow). Both women underwent several very successful skin graftings. However, there remained the imposing problem of baldness, unacceptable socially, religiously, and emotionally. Ordinarily, the ship's services can meet most every medical need which might arise, but in this instance, we were unable to improvise. The nurses related the problem to Catholic Chaplain CLARK who donated the money needed for two wigs, to be purchased in Hong Kong by a corpsman on R&R. The wigs will surely crown the total hospitalization period for Say and Chau in all respects.

NUMBER "ONE" JUNIOR INTERPRETER

On September 9, 1969, the International Ward

Staff held a hospital discharge party for eight-year-old Tran Ba, our junior interpreter, ward-work patient detailer, and miniature goodwill ambassador.

Ba was initially admitted to the Repose in April of 1968, with multiple diagnoses of megacolon, imperforate anus, perineal fistula, bilateral hydroureters, and chronic urinary tract infection, for which a sigmoid colostomy was performed. He was discharged after a three month's stay and was readmitted two months later for evaluation and consideration for definitive therapy.

During this latter and prolonged admission due to the somewhat continuous casualty load, Ba underwent many examinations and tests, culminating in a surgical perineal exploration with plastic revision of the recto-perineal fistula, a Swenson pull-through procedure, and placement of a suprapubic tube. His physical progress was gradual, but steady; his intellectual capacity, overwhelming; and his quiet friendly manner, contagious for everyone, including staff, ships' crew, and patients. He became proficient in speaking and understanding English, and was frequently called upon to interpret for all wards, clinics, and doctors whenever the Vietnamese adult interpreters were busy elsewhere.

Because we all recognized the tremendous contribution that he had made in improving human relationships and understanding, it was only natural that departments and divisions throughout the ship would come to say good-bye and to convey their best wishes at the time of Ba's departure. Many aboard the ship had never seen a more representative group of persons attending a farewell function, expressing their sincere gratitude to one so deserving.

Ba, of course, took this in stride, wearing a specially designed uniform which represented both countries. Because of the strategic location of his home and the fear of reprisal however, the uniform was voluntarily removed and folded with the comment that he would return to the ship for it after the peace.

Ba's farewell discharge party, September 1969—(L to R) LTJG B. E. Hughes, Ba, LT K. E. Campen, (Standing) LT F. M. Petrykowski, LT D. K. Hoblitzell.

Ba has since returned for a follow-up visit, appearing well and happy. Called upon to interpret, he again demonstrated his unique liaison language skills with both children and adults, but this time out of uniform.

LITTLE MISS MONTAGNARD

Noi (knowee), the USS Repose's most pert, petite, precious, and precocious child, as well as a memorable patient, will be recalled in conversation for many months to come by military patients, hospital staff, ships' company, and officers alike, who contributed outstandingly to her total care. They will vividly remember the seemingly hopeless physical and emotional state in which she was brought to the ship, and recollect the tragic history of the how and why's which became known several days after admission.

Noi, at that time, was an emaciated five-year-old Vietnamese Montagnard child of fifteen pounds—truly more animal-like in her appearance, position and responses, than human. She was unaccompanied by person or history, and was decidedly unable to communicate with anyone. Outwardly, she responded only to painful stimuli with short, barely audible, whimpering sounds, lying rigidly in a semi-fetal position. Because of marked knee contractures and extreme malnutrition, she was unable to stand, and appeared never to have walked in her life. She was

acutely ill with obvious signs of extreme dehydration, pallor and fatigue. Petechiae and purpura almost completely covered her pale, light olive skin. Alopecia, pedal edema and an enlarged abdomen were evident. One instantly wondered how anyone in this condition could have survived at all.

The reason became apparent once treatment was started, however. Noi totally resisted and rejected everything offered to her, including the intimacy of being held, clear liquids, medications and IV's. Somehow she mustered sufficient energy to spit, bite, pinch, and throw everything within reach. She deftly, and at her own discretion removed IV tubing, needles, cutdowns, and posterior leg splints, even when positioned with armboards, Kerlix mittens, and restraints. She accomplished this in routine fashion by first chewing a very small opening into a mitten which allowed for the exit of only one finger. This was done in such a surreptitious manner that one had to check often, and very closely, for the hole. Frequently it was only a matter of ten or so minutes before equipment could be found scattered everywhere. Altering the arm positions and wrapping procedures, as well as varying the types of materials used, failed to eliminate the problem. The only thing that did gradually improve was that instead of finding the equipment scattered about, wrappings were found neatly rolled into balls with the splints stacked at the foot of the bed, and the IV infusion shut off at the three-way-stop-cock-connector tubing. When approached, Noi would appear as though asleep, lying on her left side or abdomen in semi-fetal position with knees and arms drawn as close to her chin as possible.

Noi has only one surviving relative, her father, who is presently under prolonged treatment for osteomyelitis involving the legs, resulting from gunshot wounds. The situation preceding admission was subsequently related by him and described as follows. The Viet Cong invaded their mountain village, and indiscriminately shot and killed many civilians of all ages, including Noi's mother, brothers, sisters, distant cousins, aunts and uncles. Noi had actually witnessed some of this in her home. Her father was shot through both legs, and the child was left to die of obvious illness. Apparently very few were left in the village and since neither Noi nor her father could fend for themselves, they were without food and water for days until found by the Marines. Since Montagnards have no calendar, year-animal associations, or time concept, it became difficult to discern the specific number of days involved. Fortunately, her father spoke some Vietnamese and had had enough dealings with a few villagers to be able to approximate both his and her age. He could not calculate the ages of the others, nor the number of years he had been married.

With multiple diagnoses of malnutrition, Falciparum malaria, and intestinal parasites, it became apparent that Noi's diet would have to be supplemented orally. Since she continued to reject anything by mouth with spitting and voluntary vomiting, a naso-gastric tube was inserted. She continued to vomit however, regardless of the tube or solutions introduced, unless asleep. The staff learned, after a short time, to insert the tube and allow a half-hour or so before instilling anything into it. Otherwise the tube and contents would be returned as a matter of routine procedure.

Because of the voluntary regurgitation, Noi was offered the choice of taking medications and soft diet tube feeding orally or by tube. Interestingly, she continued to choose the tube, offering little if any resistance to its insertion. She soon incorporated this device, however, in her routine of equipment removal and disassemblement. Reinsertion of the tube was accomplished at Noi's discretion, 3-4 times per 8 hours. During this period of at least seven days, four patients and members of the ships' company volunteered to hold her close but loosely, for 15-30 minute periods several times a day. The importance of this had been explained and the volunteers were instructed not to become disappointed by the child's lack of response to them individually or to the surroundings in general.

Being closely-held directly followed the removal of Noi's restraints by the staff only,—never after removal by Noi. She resisted little, but was unable to show pleasure or give anything in return. She could be seen at any time amid the ward activity with head bowed, eyes closed, cuddled into as much of a ball as position and posterior leg splints allowed. She said nothing and rejected all overtures from children and adults.

For the better part of two weeks, this non-responsive, non-receptive behavior continued. Following this, however, there occurred a noticeable change—the first real clue to progress at least. Noi chose food by mouth rather than tube. She began to show interest in the food being eaten by another child. She accepted such food only if mixed together and offered in a paper cup, and, if allowed to feed herself with her fingers. She carefully examined the contents, removed the undesired portions such as carrots and peas, but ate rice and meats well. She continued to ignore liquids and still took medications by tube.

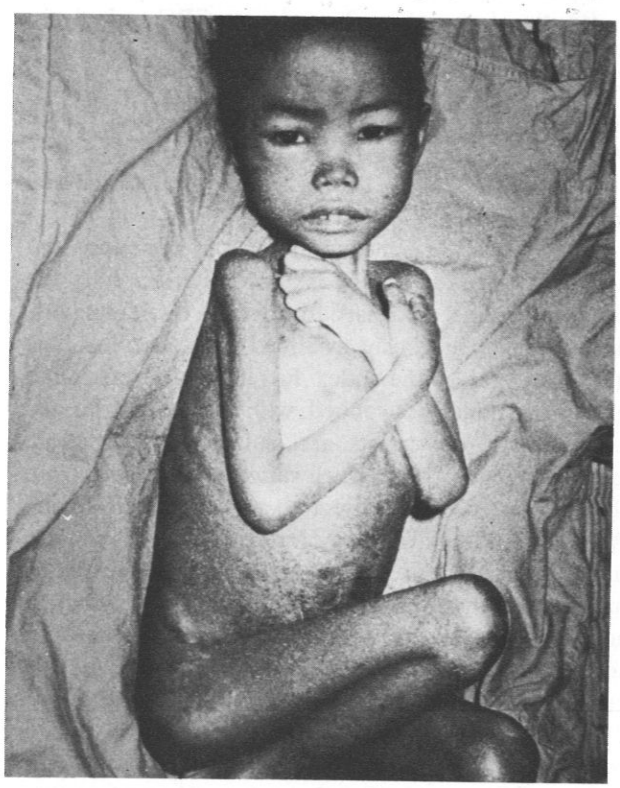
Noi remained basically withdrawn from the overall activities of the ward and patients until the ship went into floating dry-dock at Subic Bay, approximately one month after her admission. By this time her twice daily passive-exercise visits to physiotherapy were proving successful. Her posterior leg splints had been gradually extended almost into normal position and her appetite improved tremendously. Although not yet walking, she was beginning to show positive motor-muscular and emotional responses during the course of total and consistent, day-by-day care. Noi was included in a group visit-play-period trip to the local nursery school. While there she continued to maintain a quiet, but non-rejecting type of aloofness and indifference to both the children and their activities. Upon returning to the ship however, a new Noi gradually emerged within a few days.

During the withdrawal period of one month she had passively learned a few Vietnamese words relating to food, and had become familiar with the names of children, nurses, and corpsmen. She now began to walk with assistance, laugh, and take part in the daily ward activities and routines. She offered her newly acquired skills and knowledge voluntarily to those familiar to her, adult patients, chiefs, doctors, ships' crew, and officers alike, calling special ones by nicknames invented for them by her.

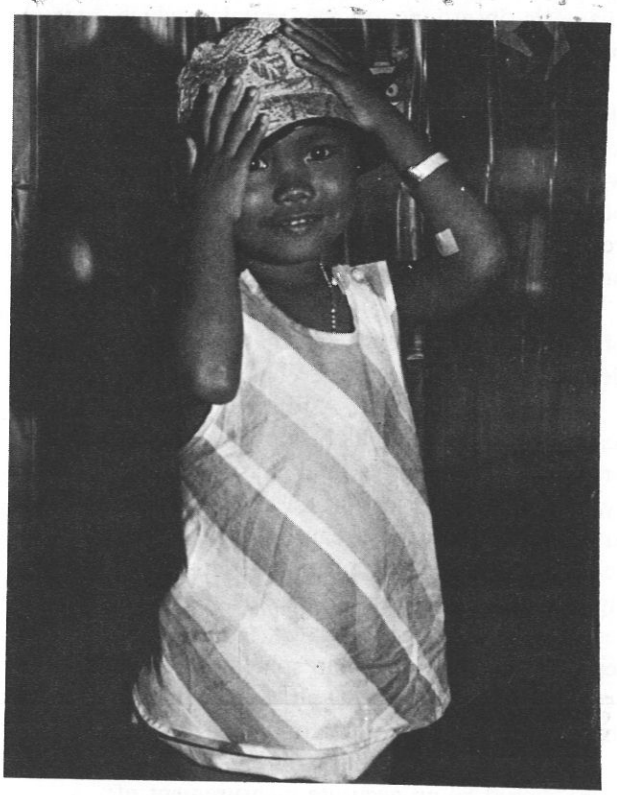
From this point onward Noi made rapid progress medically, physically, and emotionally, becoming our cherished "Little Miss Montagnard." She is overwhelmingly intelligent, active, alert, assertive, and speaks a combination of English, Vietnamese, and Montagnard. Noi weighs thirty-four pounds (double that of admission), and is presently enrolled in a Catholic boarding school, thanks to SGT HUONG, one of our two Vietnamese ARVN interpreters on board. Almost half of his monthly salary goes into her support and education, and this will continue as long as Noi's father is unable to care for her.

Since Noi is still being followed on an out-patient basis because of occult blood in her stool, a return visit has been made. Only after finding children and adults whom she recognized did Noi's pleasant, outgoing personality become evident. She seemed to have developed more grace and self-confidence, and was decidedly healthy and happy.

Through an International Ward, the USS Repose can provide the setting for a warm, continuous and



Noi upon admission to International Ward (A 5-year-old Montagnard girl, weighing 15 pounds).



"Little Miss Montagnard"—(Now a 5-year-old, 34 pound, pert, petite, precious and precocious Montagnard child).

intimate relationship, where women and children find satisfaction, opportunities and incentives for growth, understanding, love, and trust, not only as individuals, but on an international level between two peoples of different cultures.

OCCUPATIONAL MEDICINE SECTION

REVIEW OF "THE HERNIATED DISC SYNDROME"

J Occup Med 11:475–479, September 1969.

Recent innovations in conservative care of the patient with the herniated disc syndrome (HDS) have made necessary several changes in the investigative and therapeutic sequence of procedures. When Mixter and Barr described the herniated nucleus pulposus concept, surgical discectomy was accepted as a panacea.

In the past ten years it has been shown by several authorities that the majority of HDS patients can be satisfactorily treated by conservative means, leaving only about 5% without adequate relief. These conservative measures include procaine, and, more recently, corticosteroid injections into the peritrochanteric insertions of the muscles which extend between the spine and the hip.

These observations make it necessary to rearrange the order of procedures for the practitioner to follow in investigating and treating the HDS patient. As always in medicine, this order begins with the most beneficial, simplest, safest, most economical procedure, and progresses through the less productive and valuable procedures.

Through experience in the conservative treatment of 2,000 HDS patients during the past 8 years, a definite procedural sequence has evolved.

History and Physical: A routine history and physical examination should be done to rule out other organic as well as emotional causes of the low back syndrome. Special emphasis should be placed on arthritic and neoplastic causes. A history of recurrent bursitis, "neuralgia," or myositis may be very significant. Tenderness in the intercostal cartilages, tenderness over the pronator teres bursa, and/or tenderness at the scapular spine where the levator scapular muscle inserts, all easily palpable sites, indicates subclinical states of arthritis.

As a routine procedure during the examination, there should be an accurate measurement of:

(1) *Range* of *motion* of the hip and low spine, and the amount of restriction on straight leg raising.

(2) *Reflex changes*. Using a gravity hammer, the ankle reflex should be recorded, by means of a photomotograph, *before* treatment. Subsequent improvement can be measured periodically by the same method.

(3) *Motor changes*. Strength is best estimated by comparing to the normal side.

(4) *Sensory change*. This is measured grossly by the usual pin prick and touch method.

(5) *Atrophy*. This should be measured with a tape. Any further improvement in atrophic muscles can be ascertained if the original size of the muscle group is recorded.

Routine Laboratory Procedures: CBC, urinalysis, Kahn, serum protein electrophoresis, uric acid, RA (latex precipitation), and LE prep, sedimentation rate, tuberculin and undulant fever skin tests should be included.

Therapeutic Tests: These include intralesional and intravenous injections.

(1) Procaine (if there is no history of sensitivity) and corticosteroid injections are injected into the peritrochanteric area as described in earlier papers. The area is vigorously swabbed with alcohol. The guiding finger is the index finger of the left hand, and it is similarly swabbed with alcohol. With the index finger, the points are isolated by palpation. Usually a tender ridge or elevation radiates out from the trochanter in the direction of the muscle fibers. As a rule this elevation points from the trochanter directly toward the area of most severe pain. It is noteworthy that the areas involved are, in normal adults, some 12 or more inches from L4-5, and several inches from the sciatic nerve as well. With the guiding finger on the spastic area, a skin wheal of 2% procaine hydrochloride is made. Then, while continuing to inject the procaine, a 1½ inch, 22 gauge needle is advanced down into the tender area. When the trigger area has been properly infiltrated, it will usually smooth out and become nontender; in

spite of a 2 to 3 cc injection of procaine into the already elevated area, it will be reduced in size. This phenomenon reflects local relaxation of a spastic muscle attachment. Injection of procaine merely relieves the spasm temporarily. The ensuing injection of corticosteroid (usually 40 mg) prolongs this spasmolysis.

(2) Intravenous colchicine (1/60 gr) response is compared with relief obtained from IV saline done as a double-blind procedure. The colchicine therapeutic test is performed as follows:

The first injection is given by vein and a 24-hour period of observation is used to assess the amount of relief obtained. The second injection (either colchicine or control) is given 48 hr later and a similar 24-hr period of observation is evaluated. If the patient chooses colchicine as the injection which gave him generalized relief, he is placed on colchicine orally. If, after 3 weeks of colchicine therapy, the patient continues to notice satisfactory relief, additional systemic therapeutic trial of colchicine is utilized regardless of the serum uric acid level. A high percentage of patients with normal or low uric acid levels obtain marked relief from such therapy and many patients would be denied effective therapy if colchicine were given only to patients with elevated serum uric acid.

(3) *Ordinary frontal and lateral films of the spine and hip, both in flexion and extension*: This procedure serves primarily to rule out metastatic lesions, spondylitis, fractures, and other conditions as the etiologic basis of the HDS.

(4) *Myelogram with cerebrospinal fluid (CSF) studies*: At this stage of study a routine lumbar puncture should be performed with a 19-22 gauge needle. This should be accomplished on a fluoroscopy table so that a myelogram can be done simultaneously.

Immediately after the large gauge needle is placed into the subarachnoid space, fluid dynamics should be studied. If, after the fluid level is stabilized in the manometer, cardiac pulsations and respiratory influences can be seen affecting the column, free communications are indicated. All patients are then asked to cough violently and the height of the column is determined. The patient is then asked to hold a deep breath while bearing down against the rectum; again the column height is determined. The much higher pressure found with straining (which is pain-free in most HDS patients) rather than with coughing (which is extremely painful in all HDS patients) casts doubt on the theory that increased CSF pressure is a significant factor in HDS pain. In fact, it adds credence to the previous thought that coughing produces pain by jerking the already spastic, painful muscles that are involved in the HDS.

After the pressures are determined, three specimens of CSF should be collected. These should be studied for cells, protein, serology, and culture. Seven to nine cc of contrast medium is then injected slowly for myelography. After the myelograms, every effort must be made to remove all the contrast media. If necessary, the needle should be moved to a different interspace.

Intrathecal methylprednisolone: This is administered either immediately after myelography contrast media is removed or as a separate procedure. The usual amount injected is 120 mg. The most dramatic improvement is seen in patients who have had previous contrast myelography. This suggests that contrast medium probably is not innocuous, but that it probably creates arachnoiditis with edema of the root sheaths. This edema is reduced by the anti-inflammatory action of the methylprednisolone.

Traction and Physiotherapy: The most effective form of physiotherapy is pelvic traction. This "stretches out" spastic back and pelvic muscles. It also imparts "pull" on any possible crushed or collapsed intervertebral areas.

Surgical exploration of the spine: This is reserved as a last procedure. Since it represents a very debilitating, disabling type of surgery with a long convalescence, it should be the last procedure carried out. Fewer poor surgical results will be encountered if non-surgical patients are "culled out" earlier by conservative treatment.

Conservative measures as outlined above will produce relief in 90 to 95% of HDS patients. These data and results point out that surgery is the least rewarding, yet most hazardous and expensive, of all methods of treatment for the majority of HDS patients. It should be further stated, however, that for the 5 to 10% who do not obtain adequate relief with conservative treatment, surgery holds the only promise. For those patients in whom primary tumors are producing the HDS, there is no substitute for surgery.

REVIEW OF "WINTER ITCH— ITS CAUSE AND PREVENTION"

The SBS Counselor 14(4), October 1968.

"Winter itch" is a rather widespread affliction occurring mainly in the northern states and Canada during winter months when the relative humidity of heated rooms is low. It is known to occur in the

south, however, in the late winter months during prolonged periods of low humidity. The affliction manifests itself as a dry uncomfortable feeling experienced shortly after washing with soap and water. Discomfort is usually of short duration in normal skin but those with inherent dry skin may develop chapping or otherwise irritated skin. At times the dryness and chapping can become quite severe causing breaks in the skin which in turn may become infected, resulting in troublesome dermatitis.

What is Dry Skin

There may be mild dryness or severe dryness and chapping. As the severity increases, breaks may occur throughout the stratum corneum permitting soils and cleansing agents to contact the living cells below the barrier.

Deep breaks or fissures may occur when the skin is flexed. Bleeding will occur if capillaries are broken. Foreign substances can enter the break and aggravate the living cells causing inflammation. Swelling caused by fluid and cellular infiltration into the dermis occurs. The inflammation further stimulates the living cells of the skin and a new cycle starts. The dryness and chapping become more severe.

Mechanism of Protection

Much is known now about the skin's natural mechanism of protection that helps to explain the causes of dry skin. According to Jacobi the water content of the stratum corneum depends primarily on the quantity of water-soluble hygroscopic and surface-active materials present. These components he calls collectively, the "Natural Moisture Factor" of the skin, or the NMF. The loss of NMF was claimed by Jacobi to be one of the main causes of dry chapped skin.

Production of NMF and its diffusion to the surface is probably decreased in cold weather, and since perspiration is decreased, NMF is not sufficiently replaced when it reaches the surface and is removed by cleansing the skin. Jacobi further reasons that the secretion of sebum is lowered in winter and the loss of this water-repellent secretion permits an increased loss of NMF from the inadequately protected surface.

Some further work by Jacobi indicates that the stratum corneum treated to remove NMF is repellent to liquid water but still absorbs vapor. However, it releases absorbed water almost three times faster than the untreated corneum. In other words, pure keratin structures are unable to hold significant amounts of water for appreciable periods of time.

The skin will lower its water content immediately if the environmental humidity is lower than the moisture concentration in its structure. This results in the skin becoming dry, brittle and rough. Blank and others have shown that, because of the barrier layer, the amount of water vapor supplied to the corneum from within the body is inadequate to counteract the loss by evaporation under conditions of low humidity. If keratin alone were responsible for the water balance of the corneum, a drop in humidity would cause a dry, scaling, chapped skin. This is normally prevented in healthy skin by the presence of the NMF in the stratum corneum where it serves three main functions:

1. Hygroscopic retention of moisture
2. Counteraction of keratin water repellency by surface tension means
3. Absorption of water vapor present on skin surface from perspiration and outside sources.

More recently, Onken and Moyer showed that when oil-soluble materials were removed from the skin's surface a great decrease in water barrier occurred. This could be partially restored by returning the fatty material to the surface. Matolsty confirmed the effect of oil-solvents on permeability to water and found that agents influencing plasma membrane proteins produced a marked increase in permeability to water.

Prevention of Dry Skin

In summary, it is concluded that, if dry skin is to be prevented, an action that tends to cause the stratum corneum to lose water at an abnormal rate must be overcome. In the words of Blank: "The development of dry skin is more complex than a simple deficiency of natural oils. The ability of a skin cream to prevent or relieve dryness appears to be a function primarily of its ability to increase the water content of the stratum corneum.

We would like to say further that the practice of good skin hygiene will offset a condition leading to winter itch. This entails avoidance of contact with solvents and irritating chemicals, thoroughness of rinsing and drying after the wash, the use of safe and effective hand cleaners and protective clothing, the application of suitable barrier creams to protect against irritating soils, and the use of moisturizing and medicated creams when there is need for frequent skin cleansing. A cream should be selected that will serve to rehydrate the stratum corneum,

reduce rate of moisture loss from the skin, and provide acid buffering to support normal skin acidity.

This practice will insure that the skin retains its NMF and will minimize the tendency toward winter itch during the dry winter months.

FLAMMABLE ANESTHETICS

The promulgation of safe standards and conditions for the handling and use of flammable anesthetics and liquids was accomplished on October 6, 1969 as BUMED INSTRUCTION 5100.1C. The enclosure to the instruction, titled "Code for the Use of Flammable Anesthetics" serves as the standard for the requirements contained in the Instruction. Additional copies of the "Code for the Use of Flammable Anesthetics" and placards titled "Safe Practice in Anesthetizing Locations" may be obtained by written request addressed to Bureau of Medicine and Surgery (Code 732).

THE SO-CALLED SAFETY SOLVENT

Trichloroethylene as a cleaning agent for generators and motors, and as a paint remover, is gaining widespread shipboard use. A number of recent fatalities and injuries have resulted in closed spaces aboard ship.

Exposures to this chlorinated hydrocarbon for 24 minutes at 2% concentration can result in death. Such concentrations are readily obtained in such unventilated spaces as reefer flats, generator rooms or other spaces not provided with dilution and exhaust ventilation.

Medical department personnel are urged to determine from the supply department if trichloroethylene is stored aboard. A guide for conditions of use and required protective measures are prescribed in BUMED INSTRUCTION 6260.12 of 12 Jan 1966, subject "Halogenated Hydrocarbons; health hazards of." Knowledge of such precautions should be required of issuing and supervisory personnel. Assistance in all matters pertaining to this and other solvents may be obtained from the industrial hygiene officers located at the Preventive Medicine Units.

REVIEW OF "EPIDEMIOLOGY AND OCCUPATIONAL MEDICINE"

J Occup Med 11:561–563, November 1969.

The partnership between epidemiology and occupational medicine is quite ancient, and some of the earliest classical studies in epidemiology were based on the observation of an extraordinary accumulation of disease in selected occupational groups.

The methods of epidemiology are especially well suited to the solution of a particular set of the problems encountered in occupational medicine. Epidemiology is based on observations of unusual aggregations of disease by time, place, or special characteristics of the afflicted persons. The presentation is most useful when the observations are quantitatively expressed. The application of these methods to occupational situations is clear and direct. For reasons other than those of importance to epidemiologists, groups of employees are identified and characterized, and are subject to substantial surveillance. Thus, a major portion of the epidemiologist's work has been done for him. With the rapid growth of machine-record systems, the information often is not only available but also retrievable.

Anyone interested in the presentation and control of disease has two pathways open to him. The first, and most desirable, is to anticipate problems and resolve them in advance. Often we fall short of omniscience, however, and problems present themselves in overt form. In this event, several requirements can be specified:

1. A surveillance system is needed that will signal the existence of a problem. The crudest surveillance systems suffice to detect many disease problems so that, if a supervisor complains that 30 or 40% of his work force are incapacitated, the industrial physician may well be stimulated to conduct an inquiry. Sometimes, however, the difficulty may be much more subtle, and only a very delicately attuned system may sound an alarm. This is especially true if:

   a. The illness is rare.

   b. The period between occupational exposure and the occurrence of overt illness is long.

   c. The labor force is scattered widely or migrates freely from one plant to another.

The problem of small numbers of events may be solved only by pooling the experience of a large num-

ber of industries. This raises additional problems related to differences in record systems, medical care, managerial interest, and the like.

All 3 of these problems may be cited as arguments in favor of national data repositories, and the proposition evidently has some merit. The system would be expensive as well as relatively cumbersome and unresponsive, so that the author believes that substantial evidence should be presented to demonstrate the need.

2. The extent of the problem must be expressed quantitatively. Certain illnesses are so dramatic, so rare, or so severe that the occurrence of one or a few cases is adequate justification for action. Most concerns are not this clear-cut however, and an assessment of the importance of the problem depends upon a statement of the risk of an event in mathematical terms. To an epidemiologist, the most important statistic is the rate of occurrence. The minimum requirements for the computation of rates are the ascertainment of illness and the definition of the population from which the patients came. A basic technique in epidemiology is the comparison of incidence rates in different subsets of a population. Once again, the aptness of industrial populations is evident, for they are often already subdivided by work assignment, pay-scale, length of experience, and other such characteristics that may well be of value in explaining the occurrence of illness.

3. The circumstances surrounding the occurrence of illness must be investigated. Customarily, study of the differential rates of disease in different segments of a population group directs the investigator's attention to particular times and places. Customarily, special inquiry is necessary to understand what special factors accounted for the occurrence.

The simplest cause-and-effect model is familiar to all physicians: a specific cause (often called the etiologic agent) produces a specific disease. Since the primary concerns of most physicians are to diagnose accurately and treat properly, this simple model is often all that is needed, even though the pathogenesis of very few diseases is adequately described by it. However, for the epidemiologist, this model is never sufficient. When he observes the occurrence of a cluster of illnesses, he must be concerned not only with the exposure of an individual to an etiologic agent, but also with the circumstances leading to joint exposure of the group. Understanding of the latter is frequently the important guide to prevention.

4. Steps to prevent the recurrence of similar events should be taken. If the investigation of the problem has been successful, preventive measures may be obvious. Evaluation of the efficacy of preventive procedures often involves the application of epidemiologic methods in the surveillance and quantitation of illness or injury. Three study methods are commonly employed.

a. A before and after comparison. This form of evaluation may be quite convincing, but it suffers from an inherent weakness. Many related elements in a system change from one time to another, and a decline in the occurrence of illness usually cannot certainly be ascribed to a preventive measure solely because the decline followed the institution of the plan for prevention.

b. A cross-over comparison. If the preventive procedures are instituted and then discontinued, and if the illness experience falls and rises again at appropriate times, then the presumption that the one caused the other becomes very strong. If the hazard is great, and if the risk appeared to decrease when the preventive measures were begun, certain ethical problems arise with regards to continuing a cross-over experiment.

c. A treat-untreated comparison. By all odds, the best evidence of effectiveness of a procedure is derived from an experiment in which one portion of a study population receives the preventive (or, indeed, therapeutic) measures and another similar portion does not.

These controlled experiments are often expensive and care should be taken to design them so as to obtain the most clear-cut answer possible. Certain definite principles to assure this have been enunciated.

(1) The treated and untreated groups must be as alike as possible. This ordinarily implies some form of random allocation of study subjects to the treatment categories. Random allocation does not assure that the subsets will be representative samples of the total group, and, when some special characteristics (such as age, sex, or race) that may affect the outcome are known, the random allocation should be done within these strata, so that representativeness with respect to these factors can be assured. Random selection is not haphazard, but involves strictly formalized processes which must be adhered to rigidly.

(2) The study group should not be aware that they are involved in an experiment. Especially the treated persons should not be aware that they have received something different from others. This principle is in direct conflict with the requirement for informed consent, and this conflict has not been satisfactorily resolved. Moreover, for some kinds of

studies, this principle cannot possibly be followed, because the manipulations are so evident or the active participation of study subjects is essential. All the investigator can do is remember the reason for the rule and interpret his results carefully.

(3) The outcome of the experiment should be assessed by someone who is not aware of the treatment status of study subjects. Often, this rule, too, must be broken, and, if so, the same cautious attitude should be adopted in interpreting the data.

Any set of rules such as this should serve as a guide rather than worshipped as divine law. Obviously, in many industrial situations, the problem presented may call for massive environmental change, controlled observations may not be possible, and everyone involved may need to be fully informed. If this is so, then the formal requirements of experimental design can be considered, found inappropriate, and discarded. However, one cannot thereafter claim their protection.

These considerations illustrate and, the author believes, demonstrate the very great usefulness of epidemiology to occupational health. Unfortunately, too few personnel in this field have qualifications in epidemiology adequate to ensure that these methods are used appropriately. It is the author's belief that the opportunity and the need are so great that at least a substantial number of industrial physicians should have substantial qualifications in epidemiology; and no doubt a real case can be made for a small corps of exceptionally qualified industrial epidemiologists.

Many of the previously discussed characteristics that make employed groups especially suitable for epidemiologic investigations of occupational hazards, make them just as suitable for studies without such direct relevance to employment. In recent years, the studies of cardiovascular disease comprise something of an industrial roll call: The Los Angeles County Employees Study, the Western Electric Study, the Dupont Study, the busmen and conductors of the London Transport System, the postmen of Savannah, and many, many others.

Some years ago, the author presented a list of the necessary and/or desirable characteristics, from an epidemiologic viewpoint, of a population. The population must be:

Definable. All members of the population should be known, and non-members should be readily identifiable as non-members.

Accessible.

Subject to observation and, if necessary, manipulation.

Possess the characteristics relevant to the study. Usually, this means that the disease under study does appear in the population, but, under some circumstances, the *absence* of disease may be crucial.

Again, the extent to which employee groups satisfy these requirements is evident. The major shortcoming of these populations is that they are not representative of the general population. Groups of employed persons differ from the general population, and from each other, with respect to age, sex, economic circumstances, race, and other important characteristics.

One other special circumstance of industrial medicine has substantial bearing on this discussion. In the past few years, routine health-evaluation programs for employees have increased greatly. For epidemiologists, these have importance in 2 ways. First, if done well, the results of these examinations can provide important data on the prevalence of certain conditions and diseases. Second, if proper coordination and cooperation exist, the examinations may be used to establish the baseline for a prospective epidemiologic study.

Summary and Conclusions

Almost from the beginnings of either specialty, the fortunes of occupational medicine and epidemiology have been intertwined. As both fields have become more sophisticated, the more complex, their mutual dependence has increased rather than lessened. A clear need exists for a greater knowledge among industrial physicians of the strengths and limitations of epidemiologic methods, and the present trend toward the use of employee groups for studies of diseases that have *general* rather than *local* importance needs to be encouraged and strengthened. Industry deserves high commendation for the major contributions already made in this regard, and the successes to date promise still greater rewards in the future.

NOTES AND ANNOUNCEMENTS

RESIDENCY TRAINING SERVICE OBLIGATIONS REVISED

The Department of Defense Instruction 6000.2 regarding Service Obligations for Military Medical Interns and Residents has been reissued as of 30 December 1969, with an effective date of 1 July 1970.

The major effect is to reduce obligated service for *inservice* residency training to a maximum of two years regardless of the number of years of training required for a particular specialty. A physician who is deferred under the Berry Plan for residency training in a specialty (regardless of the length of training) is required to serve a two year tour of duty (Selective Service Obligation) upon completion of his residency training. Similarly, a physician may take his training in a military residency and only be obligated for an equivalent period of time as the Selective Service obligation—namely 2 years. However, if a medical officer after completion of internship serves a period of time in a military medical specialty such as aviation, submarine or field medicine or as a general medical officer *prior* to entering residency training, the 2 year obligation may be reduced by the amount of such service up to a maximum of one year so that the obligated service required after completion of residency training would be reduced to a minimum of one year—instead of the usual 2 years maximum. (Selective Service obligations can be served off while in residency training; however the obligated services for residency training of 2 years (or one year if reduced for service described above) will still be required after completion of residency training.

The third year of obligation required under the Senior Medical Student program or an obligation incurred under any Medical Scholarship or similar program cannot be discharged while in residency training or during the 2 year (or 1 year) obligation required after completion of training.

Residency training which is primarily inservice but also may require one or two years of civilian training (for example, Orthopedics) will not increase the maximum of 2 years service required.

Civilian fellowships or residency training which are entirely or primarily *civilian* in nature (and not part of a primarily inservice program) will require 2 years' obligation for the first year of training and for any training greater than one year or less the obligation will be an amount equal to the period of training but not less than 2 nor more than a maximum of 3 years' additional service.

The above applies to medical officers *entering* training after 1 July 1970. A medical officer who is in training on or after 1 July 1970, and who was in such a program before that date, shall have his period of obligated service *recomputed* in general accordance with the above. A medical officer who is performing obligated service on 1 July 1970 for residency or similar training completed before that date, *and* who has *more* than one year of such obligated service remaining, shall have his remaining period of obligated service reduced by 50 percent, except that no reduction shall be made in an amount which would result in a remaining obligation of less than one year.

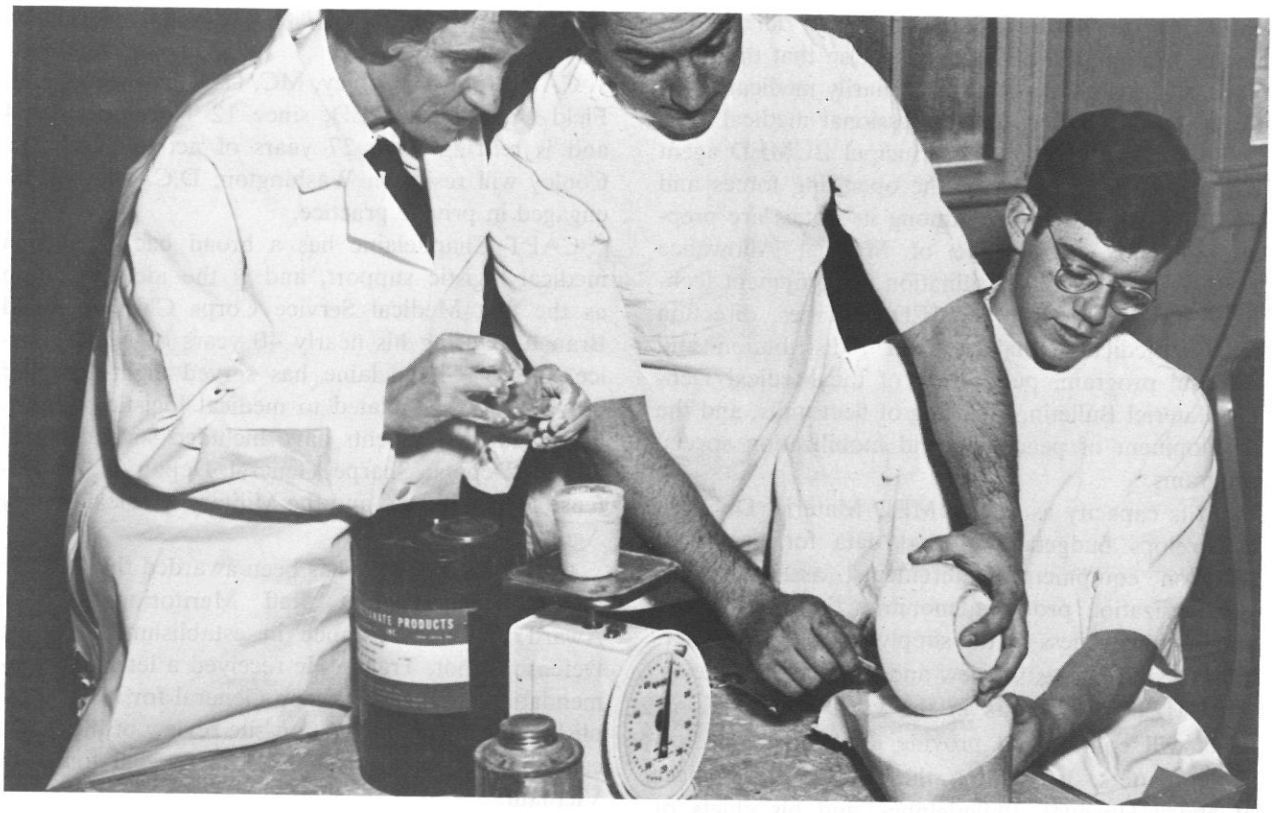
A medical officer with an unfulfilled residency training obligation which is less than one year would receive no reduction but would be required to serve any remaining months of that obligation plus any unfulfilled obligation for the Senior Medical Student or similar undergraduate training programs.

Subspecialty training would incur additional obligations along the general guidelines outlined above.

Although occasional problems may result during the phase-in period and certain questions may remain as to details in special cases, it is hoped that the above provides the major information on the effects of the changes in the DoD Instruction. It is considered that these changes are constructive and to a major degree reduce obligated service for those entering training in the future, those who are in training and those who are under obligated service for prior training, without creating severe staffing problems and interfering with the provision of specialized medical care during the phase-in period.

ANNUAL POSTGRADUATE SHORT COURSE IN SURGICAL AND ORTHOPEDIC ASPECTS OF TRAUMA

The above course will be held at Brooke General Hospital, Brooke Army Medical Center, Fort Sam Houston, Texas, from 2 to 5 March 1970. The program will encompass, in papers and panel discussions, the established principles of the immediate, early and intermediate evaluation and treatment of wounds and injuries, as well as recent developments and concepts in the management of trauma.



Students measure and mix ingredients in preparation for fabrication of a hand splint under the watchful eye of the Head of the Occupational Therapy Branch, LCDR Mary L. Rooney, MSC, USN. The students are HM3 James E. Adams, USN, and HM3 Timothy J. Laux, USN, Class 6802.

The faculty will include military authorities in the various fields of trauma and distinguished guests from civilian institutions.

Officers desiring to attend should submit their requests in accordance with applicable Directives.

NAVY CURRICULUM APPROVED BY AMERICAN OCCUPATIONAL THERAPY ASSOCIATION

On 4 November 1969, full approval was granted to the occupational therapy segment of the course in Physical and Occupational Therapy Technic conducted by the Physical and Occupational Therapy Division of the Naval Medical School in Bethesda, Maryland. The approval is for a period of four years unless major changes indicate a re-evaluation prior to that date.

When recommended by the Head of the Occupational Therapy Branch, a graduate of the course will be eligible for certification as a Certified Occupational Therapy Assistant, C.O.T.A., a recognized specialist within the civilian community. Classes beginning with 6901 are eligible for certification. In order to become certified, a graduate of the course must submit application for certification following the practical training period, to the American Occupational Therapy Association via the Head of the Occupational Therapy Branch of the Naval Medical School, Bethesda, Maryland.

A certification fee of $15.00 must accompany the application.

COURSE DISCONTINUED

Chemical, Biological and Radiological Weapons Orientation Course conducted by the U.S. Army at the Dugway Proving Ground, Dugway, Utah, during Fiscal Year 1970, announced in Medical Newsletter volume 54(4):56, Oct 1969 issue, has been disestablished by the U.S. Army as of 31 December 1969.

FIELD BRANCH, BUMED

On 1 January 1970, the office of Chief, Field Branch and Director, Materiel Division, Bureau of Medicine and Surgery, will be changed from Medi-

cal Corps to Medical Service Corps. The action results from a BUMED determination that the functions of the organization are primarily medical logistic in nature, rather than professional medical.

The Field Branch is the principal BUMED agent responsible for support to the operating forces and non-BUMED activities. Among its duties are preparation and maintenance of Medical Allowance Lists for fleet units, coordination of equipment technical reviews for non-BUMED activities, direction of the medical/dental materiel redistribution and disposal program, publication of the Medical/Dental Materiel Bulletin, outfitting of fleet units, and the development of peacetime and mobilization special programs.

In its capacity as the BUMED Materiel Division, it develops budgetary support data for new construction equipment requirements, assists in the standardization program, monitors the effectiveness and responsiveness of the supply system, and determines requirements for new and supplemental items.

BUMED consultants in the various professional fields will continue to provide direction in professional matters. In addition, the Commanding Officer of Naval Hospital, Philadelphia, and his chiefs of services, will provide *ad hoc* advice and assistance, as required.

CAPT Chapdelaine (left) is congratulated upon assuming duties as Chief of the Field Branch by CAPT J. P. McGonnell, DC, USN, Assistant Chief of Field Branch.

CAPT John L. Conley, MC, USN has been Chief, Field Branch, BUMED, since 12 November 1964 and is retiring from 27 years of active duty. Dr. Conley will reside in Washington, D.C. and will be engaged in private practice.

CAPT Chapdelaine has a broad background in medical logistic support, and is the ideal selection as the first Medical Service Corps Chief of Field Branch. During his nearly 40 years of Naval service, CAPT Chapdelaine has served eight tours of duty specifically related to medical logistic support. Significant assignments have included several Naval Supply Depots; Sharpe General Depot, USA; Defense Depot, Tracy; and the Military Medical Supply Agency.

CAPT Chapdelaine has been awarded the Defense Supply Agency Joint Staff Meritorious Service Award for his assistance in establishment of the Defense Depot, Tracy. He received a letter of commendation from the Surgeon General for his accomplishments during his first on-site review of the medical supply chain from CONUS to combat forces in Vietnam.

CHANGE IN COMPOSITION OF MEDICAL SERVICE CORPS

On 9 December 1969, the Secretary of the Navy acting under authority granted him by 10 USC 6028, established the Health Care Administration Section within the Navy Medical Service Corps. In establishing this new section, the Secretary also directed that all personnel and functions then comprising the Supply and Administration segment of the Corps now comprise the Health Care Administration Section. Accordingly, all former Supply and Administration Section officers have been administratively reassigned to the new Health Care Administration Section.

REGIONAL INSTITUTE ON OPERATING ROOM NURSING

The Association of Operating Room Nurses of Tidewater, Virginia, held a Regional Institute on October 24-25, 1969, at the Golden Triangle Motor Inn in Norfolk, Virginia. The Institute's subject material extended over a wide area from lawsuits to the use of disposable materials. CDR Anna L. Fogarty, NC, USN, and Mrs. Reva Stone, CSN, from the Naval Hospital, Portsmouth, Virginia, pre-

pared and publicized the program. Three hundred operating room nurses from civilian and military hospitals in nine East Coast states attended the Institute.

The purpose of the Institute was to provide an opportunity for operating room nurses to participate in continued professional education and growth.

The Regional Institute of the A.O.R.N. of Tidewater, Virginia, was the first to be held in this area since 1964. CDR Joseph T. Mullen, MC, USN, Chief of Surgery at Naval Hospital, Portsmouth, Va., spoke on "Mediastinoscopy." CDR Norma Gardill, NC, USN, Assistant Chief of Nursing Service at Naval Hospital, Great Lakes, Ill., served as moderator for a discussion on "Disposables—Pros and Cons."

AWARD WINNERS

LCDR Donald G. Gallup, MC, USN, and LCDR John L. Kitzmiller, MC, USN were awarded first and second place honors respectively for Resident's Papers entered at the Annual Meeting of the Armed Forces Chapter, American College of Obstetricians and Gynecologists in El Paso Texas, October 27-31, 1969. Both physicians are members of the Obstetrics and Gynecology Service at San Diego Naval Hospital.

DANIEL J. BENNETT DISPENSARY

The Daniel J. Bennett Dispensary at the US Naval Communication Station, Londonderry, Northern Ireland, was officially opened at October 15, 1969 ceremonies presided over by CAPT Almon C. Wilson, MC, USN, Medical Officer for US Naval Activities in the United Kingdom and the Commanding Officer there, CAPT Raymond E. Ward, USN. The The modern dispensary includes a dental wing and will administer to the needs of approximately 500 military and civilian personnel in the community.

The ceremony honored HM3 Daniel J. Bennett who was killed in action in Vietnam on July 17, 1965, while engaged in providing safety and comfort for his wounded comrades. The son of CAPT Harry H. Bennett, USNR, Petty Officer Bennett is survived by 2 brothers: Christopher who served as a QM3 aboard the BENNINGTON, and Patrick who serves as a DK3 aboard the USS Isle Royal.

IN MEMORIAM

CAPT Louis R. Gens, MC, USN, the former Senior Medical Officer, Marine Corps Base, Camp Pendleton, Calif. died 4 Dec 1969. CAPT Gens was born in Lawrence, Mass. on 7 Sept 1914. He received his B.S. and M.D. degrees at Tufts University. He served a rotating internship at St. Mary's Hospital, Brooklyn, N.Y. from 1940 to 1941. Dr. Gens served with First Marine Division from 1945 to 1947, and had duty at BUMED from 1948 to 1953. He was assigned to Naval Component, U.S. Naval Advisory Group, Republic of Korea Navy in 1958, and served at Headquarters Support Activity, Saigon from 1963 to 1964 as commanding officer of Saigon Naval Station Hospital.

CDR Melvin Lederman, MC, USNR reported on active duty in August 1968. He served on the surgical staff, Naval Hospital, USS Repose in 1968/69. Dr. Lederman was born in New York on 26 May 1928. He received his B.S. and M.S. degrees at University of Michigan, and was graduated from Harvard Medical School in 1956. He died 29 Nov 1969 in a helicopter crash in Vietnam.

CAPT Lloyd C. Rohrs, MC, USN, former commanding officer at the U.S. Naval Hospital, Naples, Italy died at National Naval Medical Center 28 Dec 1969. CAPT Rohrs was born in Orange, Calif. 27 July 1923. He attended Notre Dame and received his A.B. from University of California. He graduated from University of California Medical School in 1947, saw action as a division surgeon during the Korean conflict and was awarded the Navy Commendation Ribbon. He also served as division surgeon for the Third Marine Division in Vietnam. Funeral services were held at Fort Myer Chapel on 2 Jan 1970. VADM G. M. Davis, RADM R. O. Canada, Jr. (Ret), RADM F. T. Norris, RADM F. P. Ballenger, CAPT G. H. Tarr, and CAPT A. A. Helgerson were Honorary Pall Bearers.

PEDIATRICS PAPERS

The American Academy of Pediatrics will hold its 39th Annual Meeting at the San Francisco Hilton Hotel in October 1970. Request has been received for papers of general interest to the pediatrician in the Armed Services. An abstract of the paper together with the title and name(s) of author(s) should be forwarded by 8 March 1970 to John M. Dyer, M.D., CDR., USPHS; Indian Health Service Area Office; Citizen's Building, Room 624; Aberdeen, South Dakota 57401. Entire paper is required by June 15, 1970, for final selection for the program. In case of multiple authors, the name of the individual who will present the paper should be specified. In order to present a paper before the group, it is not necessary that an author be a member of the Academy of Pediatrics nor of the Section on Military Pediatrics.

CINCPACFLT/FORCE MEDICAL OFFICER CONFERENCE

On 2–3 December 1969 a meeting of force and fleet medical officers of the Pacific Fleet was held in the office of the Fleet Surgeon, RADM Frank B. Voris. The agenda included the following topics: Phase Down with Redistribution of Personnel and Material prior to T-Day; CINCPACFLT Contingency Planning; Ozone Prize; Indoctrination and Training of JMO's; Training of Hospital Corps Personnel; Adequacy of Medical Facilities Ashore and Afloat; Medical Department Inspections; Resources Management and Medical Supply Problems; Medical Regulating; Revision of Planning Factors, Evacuation Policies if Necessary; and Vietnamization.

The following officers attended: CAPT J. W. Weaver, MC, USN, Force Medical Officer, COMNAVAIRPAC; CAPT K. V. Kaess, MC, USN, Commanding Officer, NAVHOSP SUBIC; CAPT B. B. Barnhill, MC, USN, Force Medical Officer, COMNAVMARIANAS; CAPT C. J. Honsik, MC, USN, Force Medical Officer, COMPHIBPAC; CAPT R. Stevenson, MC, USN, Bureau of Medicine and Surgery; CAPT P. O. Geig, MC, USN, Force Medical Officer, COMNAVFORJAPAN; CAPT R. E. Luehrs, MC, USN, Force Surgeon, CGFMFPAC; CAPT W. F. Hansen, MC, USN, Commanding Officer, NAVHOSP TAIPEI; CAPT T. H. Conaway, MSC, USN, BUMED; CAPT D. A. Murray, MC, USN, BUMED; CAPT R. T. Arnest, MC, USN, Force Medical Officer, COMNAVFORV; CAPT D. W. Peace, MC, USN, Force Medical Officer, COMSERVPAC; CAPT A. D. James, MC, USN, Force Medical Officer, COMSUBPAC; CDR W. E. McConville, MSC, USN, OPNAV; CDR J. W. Johnson, MC, USNR, Medical Officer, COMSEVENTHFLT; CDR D. T. Lansinger, MC, USN, Force Medical Officer, COMCRUDESPAC; LCDR H. J. Boudreau, MSC, USN, EPDOPAC; LT J. A. Bowden, MC, USNR, Force Medical Officer, COMINEPAC.

All agreed that the meeting was highly beneficial and should be held on an annual basis.

AWARDS AND HONORS

Silver Star Medal

Cole, Alonso P., Jr., HM3 USN
Hartigan, Larry A., HM3 USN

Legion of Merit

Arthur, Ransom J., CAPT MC USN
Errion, Arthur R., CAPT MC USN
Ryskamp, James Jay, Jr., CDR MC USN

Bronze Star Medal

Breshears, Alan W., HM3 USN

Air Medal

Beckman, Robert C., HM3 USN

Navy Commendation Medal

Begg, James H., HMCS USN
Borlek, Dennis E., HMC USN
Bradley, Mark E., LCDR MC USN
Brown, Robert G., HMC USN
Brown, Robert T., HMC USN
Bufano, Thomas J., LT(JG) MSC USN
Cline, Ronald B., HMC USN
Dragoo, Paul E., HMC USN
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RADM John W. Albrittain, MC, USN, Deputy Surgeon General, visits USS SANCTUARY; CAPT C. E. Briggs, Commanding Officer (Left); CAPT G. J. Taylor, MC, USN, Commanding Officer Naval Hospital (Right).

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